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PROPOSED
LIVESTOCK GRAZING MANAGEMENT

for the

Tuledad-Home Camp Planning Unit

DRAFT ENVIRONMENTAL STATEMENT

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DEPARTMENT OF THE INTERIOR

DRAFT ENVIRONMENTAL STATEMENT
PROPOSED DOMESTIC LIVESTOCK
GRAZING PROGRAM
FOR THE
TULEDAD-HOME CAMP AREA,
CALIFORNIA

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Prepared by

BUREAU OF LAND MANAGEMENT
DEPARTMENT OF THE INTERIOR

Ed Hastey
State Director, California State Office

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SUMMARY

(X) Draft ( ) Final Environmental Statement

Department of the Interior
Bureau of Land Management

1. Type of Action: (X) Administrative ( ) Legislative

2. Brief Description of Action: The Bureau of Land Management proposes to implement a grazing management program through allotment management plans (AMPs) for the Tuledad/Home Camp planning units. Combined, these areas comprise nearly 700,000 acres of public lands in northeastern California and northwestern Nevada. The proposed action would implement three levels of management: systematic grazing management on 670,000 acres; custodial management on approximately 5,000 acres, and; livestock grazing exclusions, (no livestock grazing) on 19,000 acres. Construction of various range facilities would be required to implement the AMPs.

3. Summary of Environmental Impacts: Vegetation would generally increase in quality and quantity, although heavily utilized shrubs would receive only marginal rest to overcome the effects of grazing. Wildlife habitat would improve from the "moderate use" limitation on livestock grazing. Open archaeological sites would continue to be impacted by livestock. Fisheries habitat excluded from grazing activities, roughly 60 percent of the total, would be beneficially affected; the remaining 40 percent would remain in near present condition. Livestock operations may be impacted adversely in the short term, however, over the long term, increases in grazing are expected.

4. Alternatives Considered:

   a. No Action (continuation of present management)
   b. Elimination of Grazing
   c. Proposed Action with Modifications
   d. Deferred Grazing
   e. Combination of Existing Allotments

5. Comments Requested from the Following: See attachment.

6. Date Draft Statement Made Available to CEQ and the Public:

   May, 1978

ATTACHMENT

Comments on the Draft Environmental Statement will be requested from the following agencies and interest groups.

FEDERAL

Environmental Protection Agency

Advisory Council on Historic Preservation

U. S. Department of the Interior
- Bureau of Mines
- Bureau of Heritage Foundation
- Bureau of Reclamation
- U. S. Geological Survey
- U. S. Fish and Wildlife Service

Department Of Agriculture
- Forest Service
- Soil Conservation Service

Department of Commerce

CALIFORNIA - STATE AGENCIES

Office of the Governor
- Office of Planning and Research

Historic Preservation Office

The Resources Agency
- Department of Conservation
- Department of Fish and Game
- Department of Parks and Recreation
- Department of Water Resources
- Air Resources Board

NEVADA - STATE AGENCIES

Conservation and Natural Resources Department
- Environmental Protection Division
- Parks Division
- State Historic Preservation Office
- Department of Fish and Game
- State Clearinghouse

CALIFORNIA - LOCAL AGENCIES

- Lassen and Modoc County Board of Supervisors
- Lassen and Modoc County Farm Advisory (Extension Service)
- Lassen County Fish, Game and Recreation Commission
- Lassen and Modoc County Agricultural Commissioner
- Lassen and Modoc County Planning Commissions
- Modoc County Farm Bureau
- Modoc County Department of Public Works

NEVADA - LOCAL AGENCIES

- Washoe County Commissioners
- Washoe County Planning and Allocation Committee
- Washoe County Parks and Recreation Department
- Washoe County Department of Public Works
- Washoe County Agriculture Extension Service

OTHER ORGANIZATIONS

- Natural Resources Defense Council, Inc.
- Sierra Club
- California Native Plant Society
- Scientific Resource Surveys, Inc.
- California Conservation Council
- California Natural Resources Federation
- Northern California Planning Council
- Committee for the Emigrant-Bicentennial National Monument
- Nevada State Historical Society
- Trails West, Inc.
- California Woolgrowers Association
- California Cattlemen's Association
- American National Cattlemen's Association
- Society for Range Management
- California Association of 4-WD Clubs, Inc.
- Nevada Outdoor Recreation Association, Inc. (NORA)
- Nevada Off-Road Vehicle Association
- California Off-Road Vehicle Association
- National Audubon Society
- California Wildlife Federation
- Nevada Wildlife Federation
- Wild Horse Organized Assistance, Inc.
- National Wildlife Federation

PREFACE

The following environmental statement documents the analysis of potential impacts on the natural and human environment that could result from implementation of the proposed grazing management. Chapter 1 details the components of the proposed action. Chapter 2 describes the environment (natural and human) in which implementation would occur. Chapter 3 describes the potential impacts on that environment resulting from implementation. At this stage in the analysis, it became apparent that not all impacts could be foreseen during formulation of a proposal. Additional measures could be implemented to reduce or eliminate some of those impacts. These mitigating measures, which will become an integral part of the proposed action should the proposal be implemented, are set forth in Chapter 4. Chapter 5 describes the impacts which cannot be reduced or mitigated and which would therefore be unavoidable should the proposed action be implemented. Chapter 8 presents alternative ways of reaching the objectives of the proposed action.

Because this document sets out steps of an analysis, and the final outcome of that analysis appears essentially in Chapter 5 (Unavoidable Adverse Impacts), consideration of only portions of the document out of context of the whole will lead to erroneous conclusions. For example, looking at Chapters 1 (Proposed Action) and 3 (Environmental Impacts of the Proposed Action) presents an incomplete picture. Therefore, it is strongly suggested that the entire document be considered.

The grazing management presented in Chapter 1 is not a decision but rather a proposal. It will be considered in concert with the environmental analysis, economic analyses, review and comment of the public as well as individuals who would be directly affected, etc. Only after all factors have been taken into consideration will a decision be made to implement the proposal or an alternative.

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Summary

Introduction

This environmental statement examines impacts of six grazing management alternatives that would affect 642,111 acres of public land in northwestern Nevada and northeastern California.

Objectives

The major objective is to improve range condition by maintaining an upward trend in range condition with ultimate achievement of range site potential.

Resources

The area is dominated by sagebrush vegetative communities. Most of the area is in "fair" ecological range condition. Environmentally sensitive types such as aspen stands, meadows, riparian areas, wetlands, and browse stands are in poor condition. Trend in range condition is stable or upward except on environmentally sensitive areas, where trend is downward.

Wildlife is highly diverse, including deer, antelope, sage grouse, chukar, nongame birds, and numerous raptor nesting sites. Eight streams support limited trout fisheries. Fish and wildlife habitat are generally degraded and in poor condition with downward trends.

Over 8,000 archaeological sites have been predicted. There are 56 known cultural resources of *National Register* quality.

Recreational use centers around wildlife and archaeological values. About 34,000 visitor days occur annually, including sightseeing, rockhounding, and hunting.

The area is rancher/farmer dominated. Cedarville, 20 miles from the study area, is the nearest social/economic center with a population of about 750.

Thirteen ranch operations, which have some level of dependency on grazing on public lands in the Tuledad/Home Camp Study Area, contribute 11.2 percent of the regional gross livestock sales. The economic stability of most of these operations depends upon forage utilized on these public lands.

Proposed Action and Alternatives (as Mitigated)

PROPOSED ACTION

This proposal would establish three levels of management: (1) Systematic Grazing Management—Seven three-pasture and one two-pasture rest-rotation grazing systems would be applied to 670,000 acres; (2) Custodial Management—Limited stipulations and regulation of grazing would be applied to 5,000 acres of public lands intermingled with private lands; and (3) Exclusions—No livestock grazing would be allowed on 19,000 acres to protect wildlife habitat and cultural resources.

Grazing management would begin with a one-third reduction in livestock use from the present level during the first year. From the beginning, utilization would not be allowed to exceed moderate use (41-60 percent) in key areas on key species. A three-year phase-in period would provide a basis for adjusting livestock use to available forage as grazing systems are implemented. Monitoring systems would provide data on long-term progress toward management objectives, and short-term response of vegetation to specific grazing treatments. Management would be adjusted based on analysis of this data.

ALTERNATIVES

Five alternative courses of action are provided:

Alternative 1—Continue Present Management. This would perpetuate current management practices. It is assumed a 25-percent reduction in livestock use would occur over a 20-year period.

Alternative 2—No Grazing. No livestock grazing would be allowed on public lands.

Alternative 3—Proposed Action with Reductions. The proposed action would be implemented with an initial 61-percent reduction in livestock use.

Alternative 4—Variety of Grazing Systems. Grazing would be cancelled on 240,000 acres and would be deferred until June 15 on 240,000 acres and two three-pasture rest-rotation systems would be applied to 220,000 acres. In grazed areas, grazing would be regulated by proper use factors, herding, salting, and water management. There would be an initial 55-percent reduction in livestock use.

Alternative 5—Combination of Existing Allotments. This alternative would combine existing allotments to form two four-pasture grazing systems, one three-pasture system, one two-pasture system with winter grazing, and one one-pasture system with winter grazing. No grazing would be allowed on 240,000 acres. Prescribed burning is recommended to accelerate range condition improvement. Livestock reductions of 76 percent are called for.

Summary of Impacts As Mitigated

PROPOSED ACTION

Improvement in general range condition, plant vigor, and reproductive success of perennial grasses and forbs would occur. Shrubs which are heavily utilized would receive marginal rest to overcome the effects of grazing. Aspen not excluded from grazing would not show satisfactory improvement. Increased forage for wildlife would result from the "moderate use" limitation on livestock grazing. Sixty percent of all fisheries habitat would be excluded from grazing impacts. Livestock would continue to have an impact on open archaeological sites. Impacts on livestock operations would vary from slightly to extremely negative in the short term. In the long term, increases in grazing use are predicted.

ALTERNATIVE 1—CONTINUE PRESENT MANAGEMENT

Continuation of the present situation would have minimal impact on livestock operators, but would maintain range and wildlife habitat in unacceptable condition under current land-use planning decisions.

ALTERNATIVE 2—NO GRAZING

No grazing would have nearly maximum beneficial impacts on vegetation, soil, water, wildlife, and recreation, but maximum negative impacts on the ranchers and the local economy.

ALTERNATIVE 3—PROPOSED ACTION WITH REDUCTIONS

Impacts would be similar to those of the proposed action except that negative impacts would occur over a smaller area due to reduced competition between livestock and wildlife. Areas distant from water would receive little grazing pressure.

ALTERNATIVE 4—VARIETY OF GRAZING SYSTEMS

Maximum positive resource response is expected in the no-grazing areas. In areas under deferred grazing, general range improvement would occur, but slowly. Range trend in concentration areas would continue downward. Big game/livestock forage competition would be eliminated from most crucial habitat areas. Archaeological sites would suffer less disturbance than under the proposal or Alternatives 1 or 3. Economic impact on ranchers would be moderately to severely negative.

ALTERNATIVE 5—COMBINATION OF EXISTING ALLOTMENTS

Reduced stocking rates and increased rest would result in noticeable improvements in range condition. Adequate rest to overcome the negative effects of grazing would be provided for most species. Competition between livestock and wildlife for forage would be greatly reduced. Archaeological sites would be subject to trampling in the grazing areas. Economic impacts on ranchers would be moderately to severely negative. Prescribed burning would increase the rate of range improvement on some range areas.

Graphic displays of allocations of critical resources for the present situation, the proposal, and Alternatives 3, 4, and 5 follow.

EXPLANATION OF GRAPHIC DISPLAY ON USE OF SENSITIVE HABITATS

The first five graphs are arranged by the Present Situation, Proposed Action as Mitigated, Alternative 3, Alternative 4, and Alternative 5. All of the sensitive habitats are shown for each one. The last six graphs are arranged by sensitive habitats (i.e., total area grazed, fisheries habitat, waterfowl habitat, meadows, aspen, and browse). All alternatives are displayed for each one. The information is the same for both sets of graphs; it is displayed in two different ways.

With the exception of browse, all sensitive habitats are plotted showing the percent of the habitat area which is grazed annually on one axis and the number of months that are grazed on the other axis. For browse, percent of area grazed annually and percent utilization are plotted.

The percent of area grazed on all sensitive habitats was calculated by subtracting the amount of area rested (as a result of the grazing system or from grazing exclusions) from the total of that habitat.

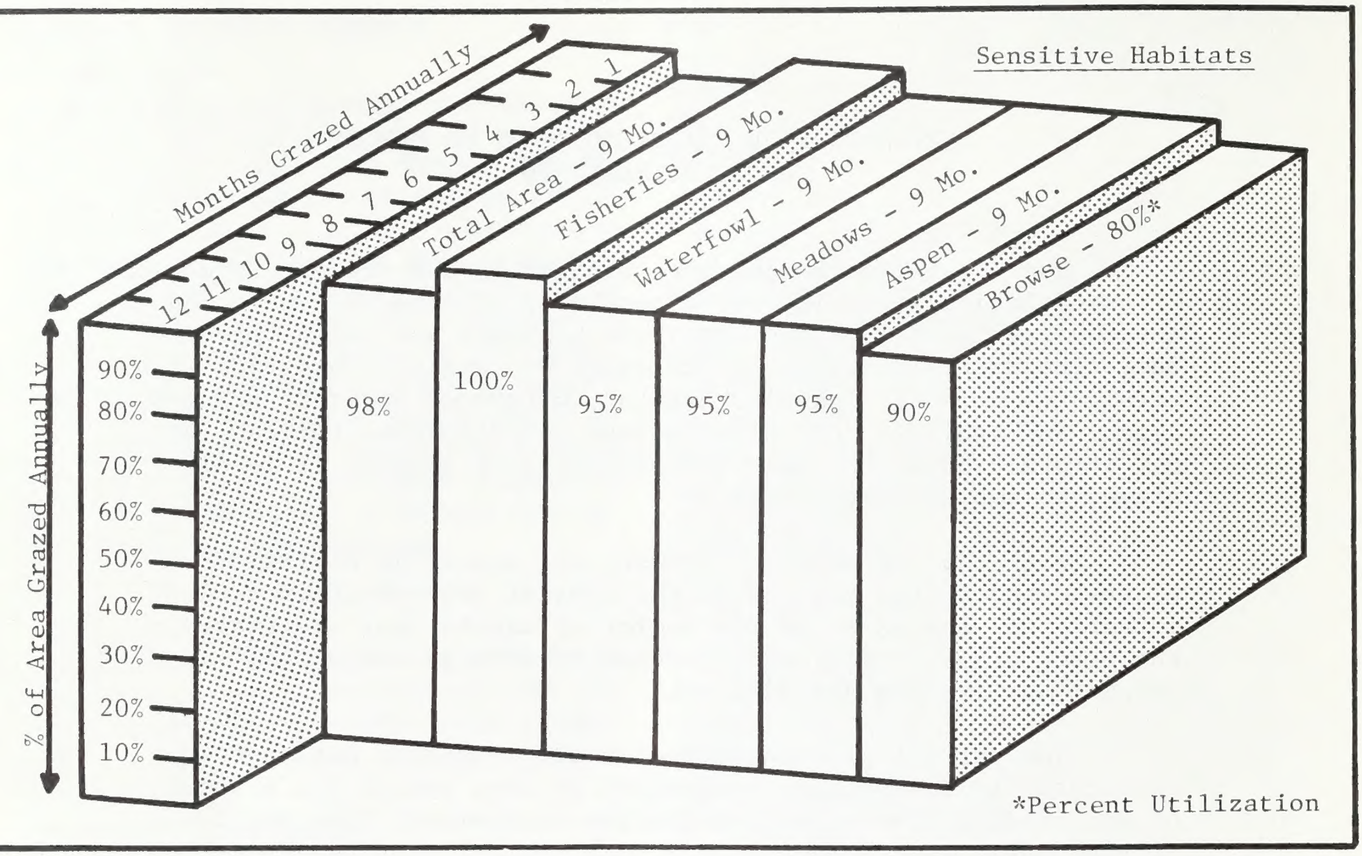
For example, assume 100 acres of fisheries habitat exists in an allotment which is grazed two years out of four and 20 acres are fenced which excludes livestock completely.

Calculation: 100 acres total - 20 acres excluded = 80 acres grazed under the grazing system. Each year, according to the grazing formula, one-half of the area or 40 acres would be grazed. This is then expressed as a percentage and shown on the graph.

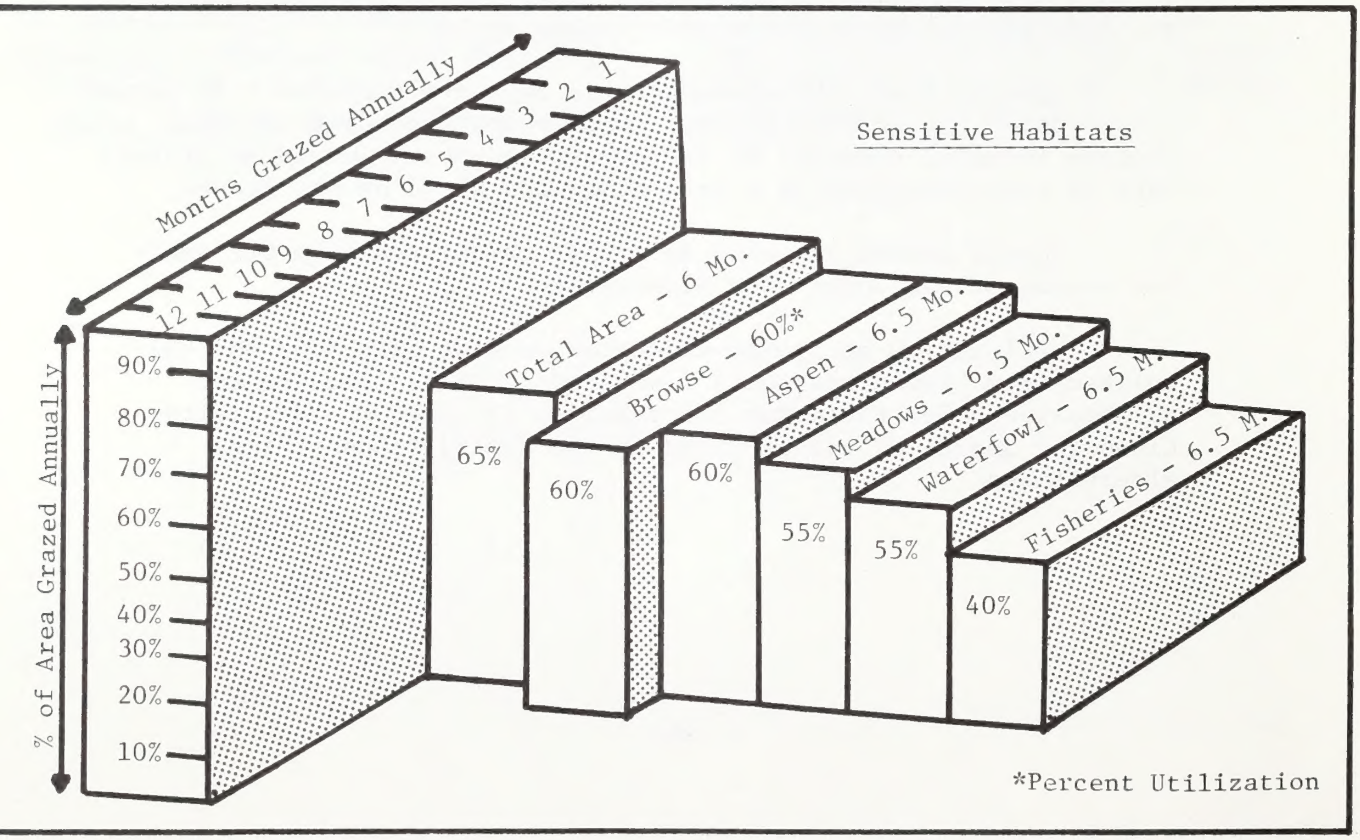
Months grazed annually is simply calculated from the maximum season of use under each alternative.

Utilization of browse under the present situation was calculated from browse transects conducted in 1976. The percent utilization under the other alternatives is based on the limitations for degree of use provided in the descriptions of the alternatives.

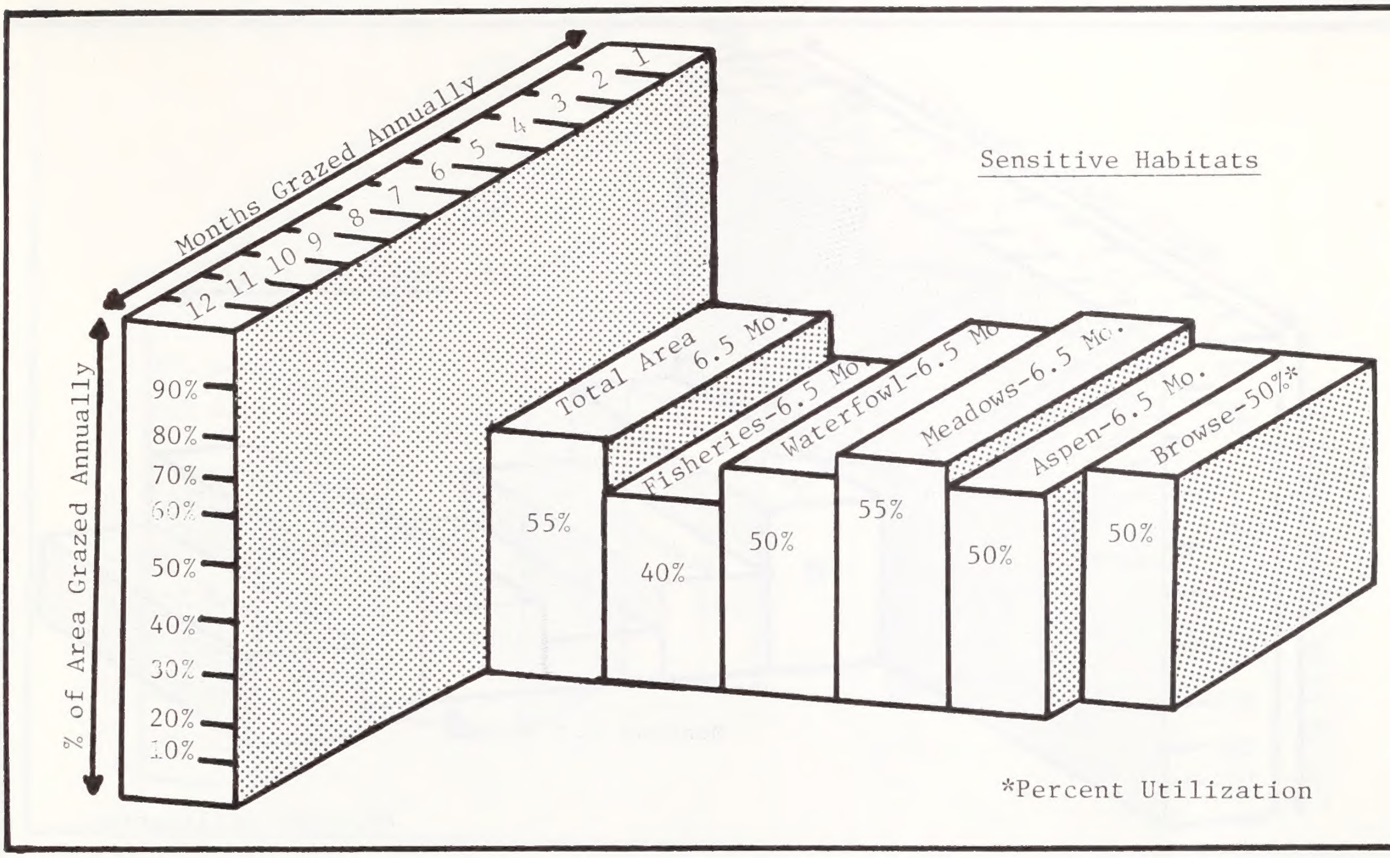
Present Situation



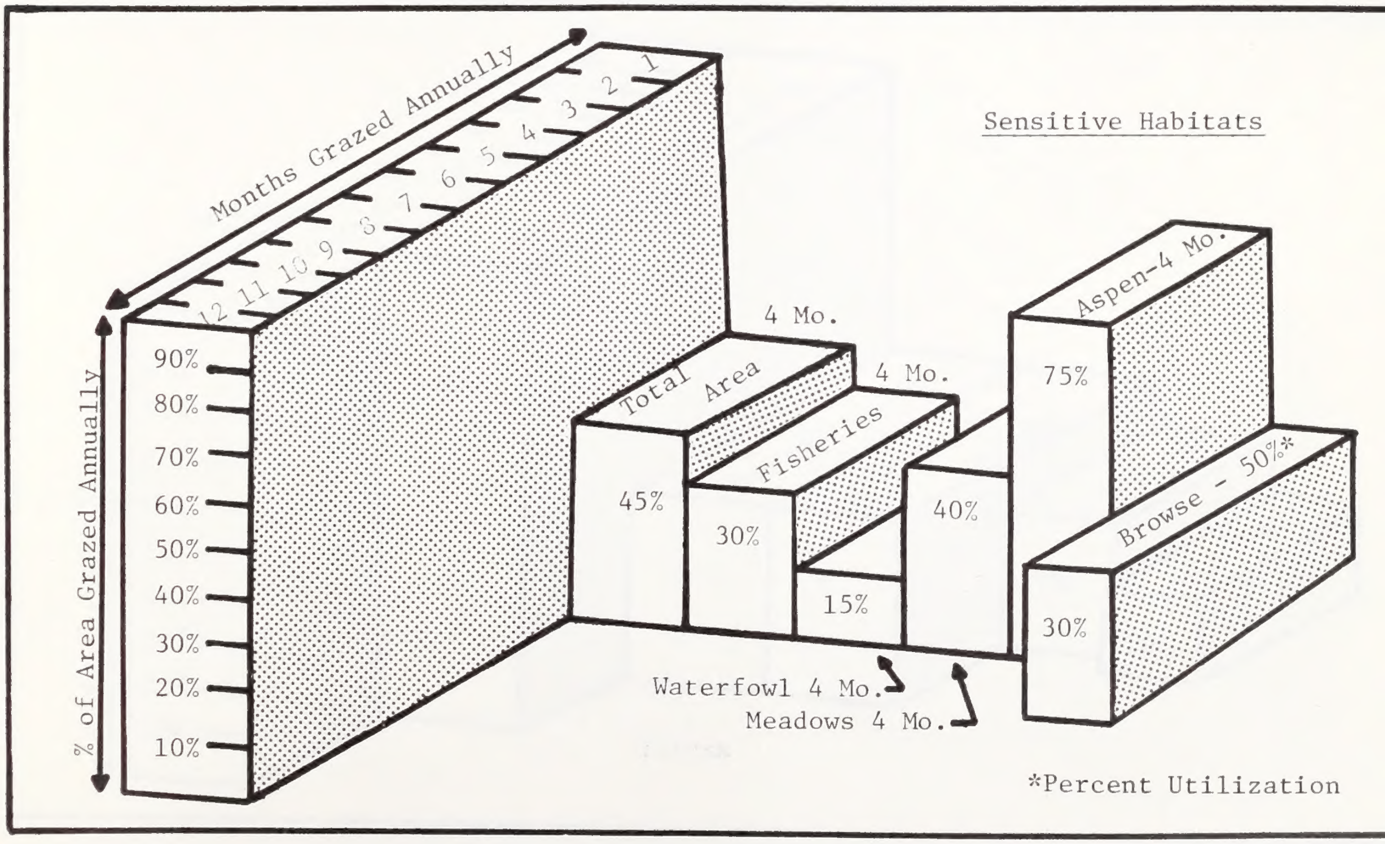
Proposal As Mitigated



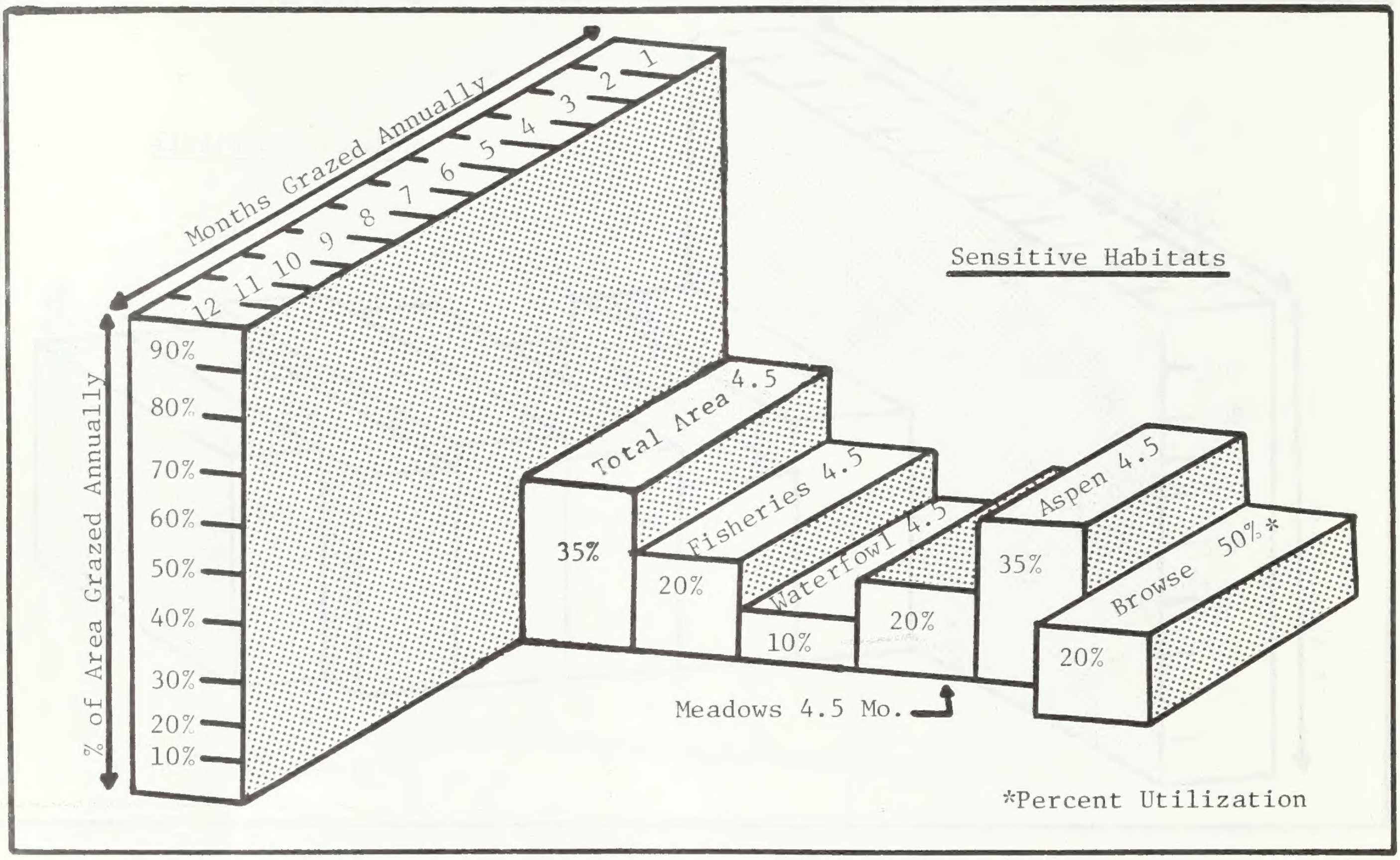
Alternative 3 - Proposed Action with Reductions



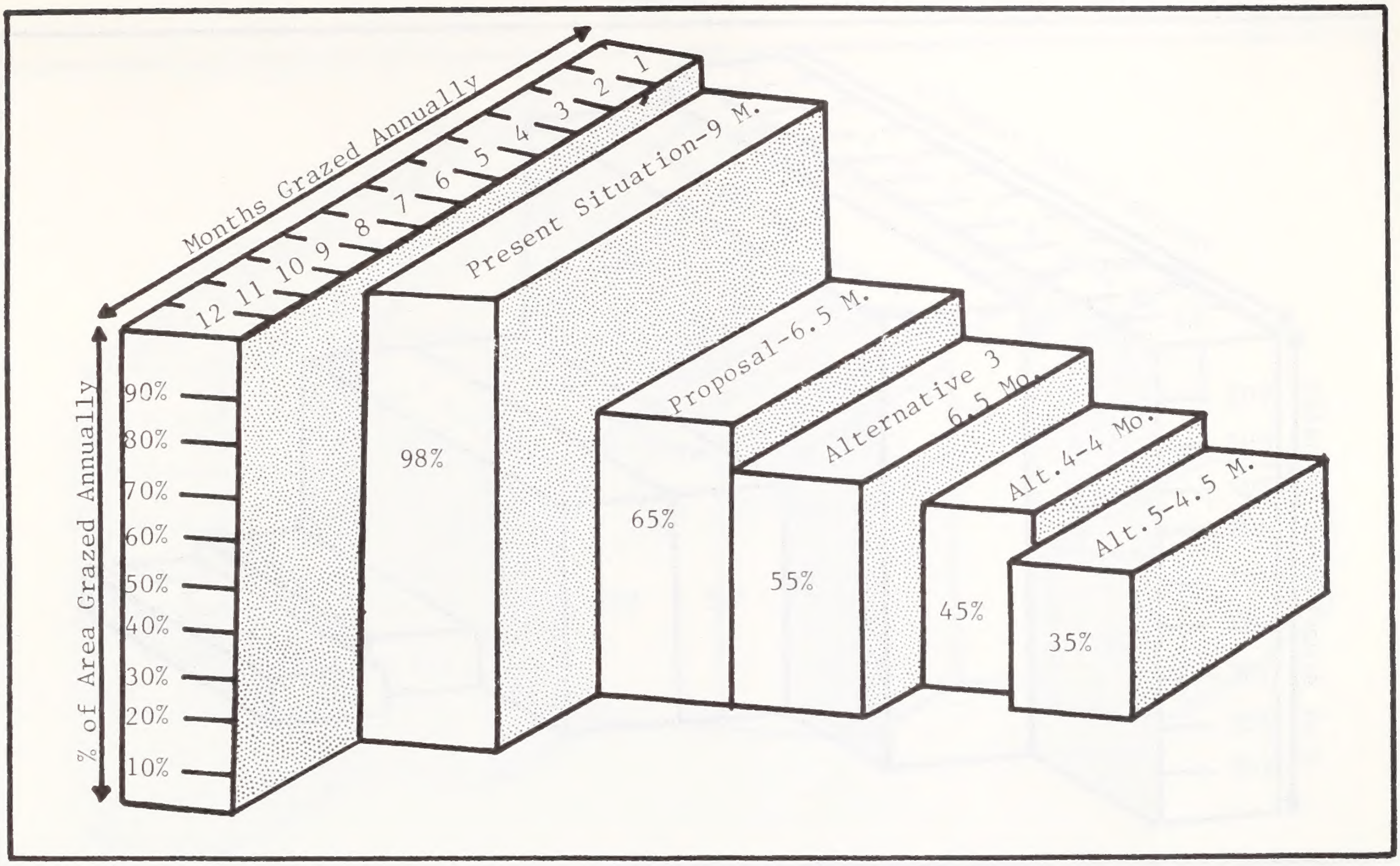
Alternative 4 - Variety of Grazing Systems



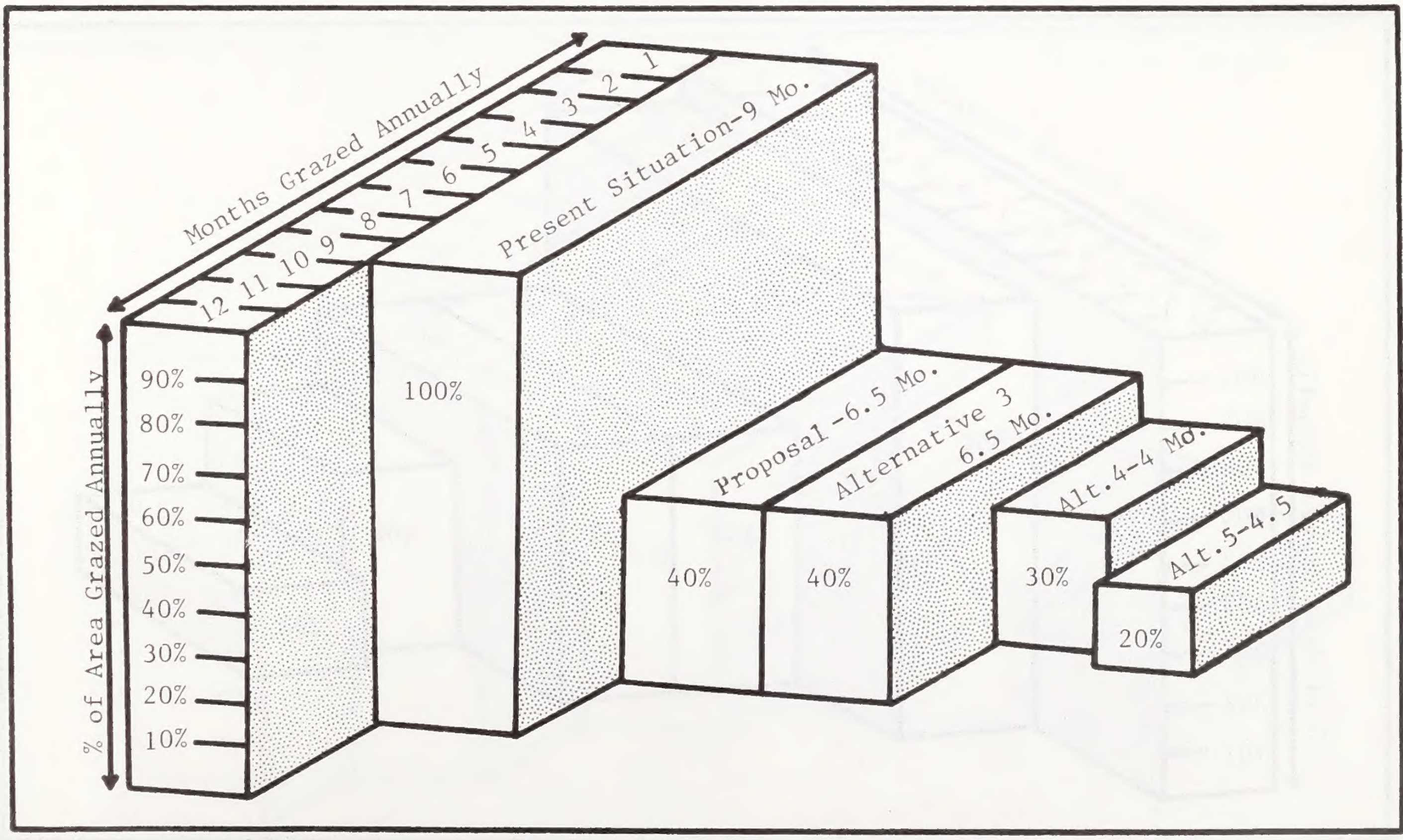
Alternative 5 - Combination of Existing Allotments



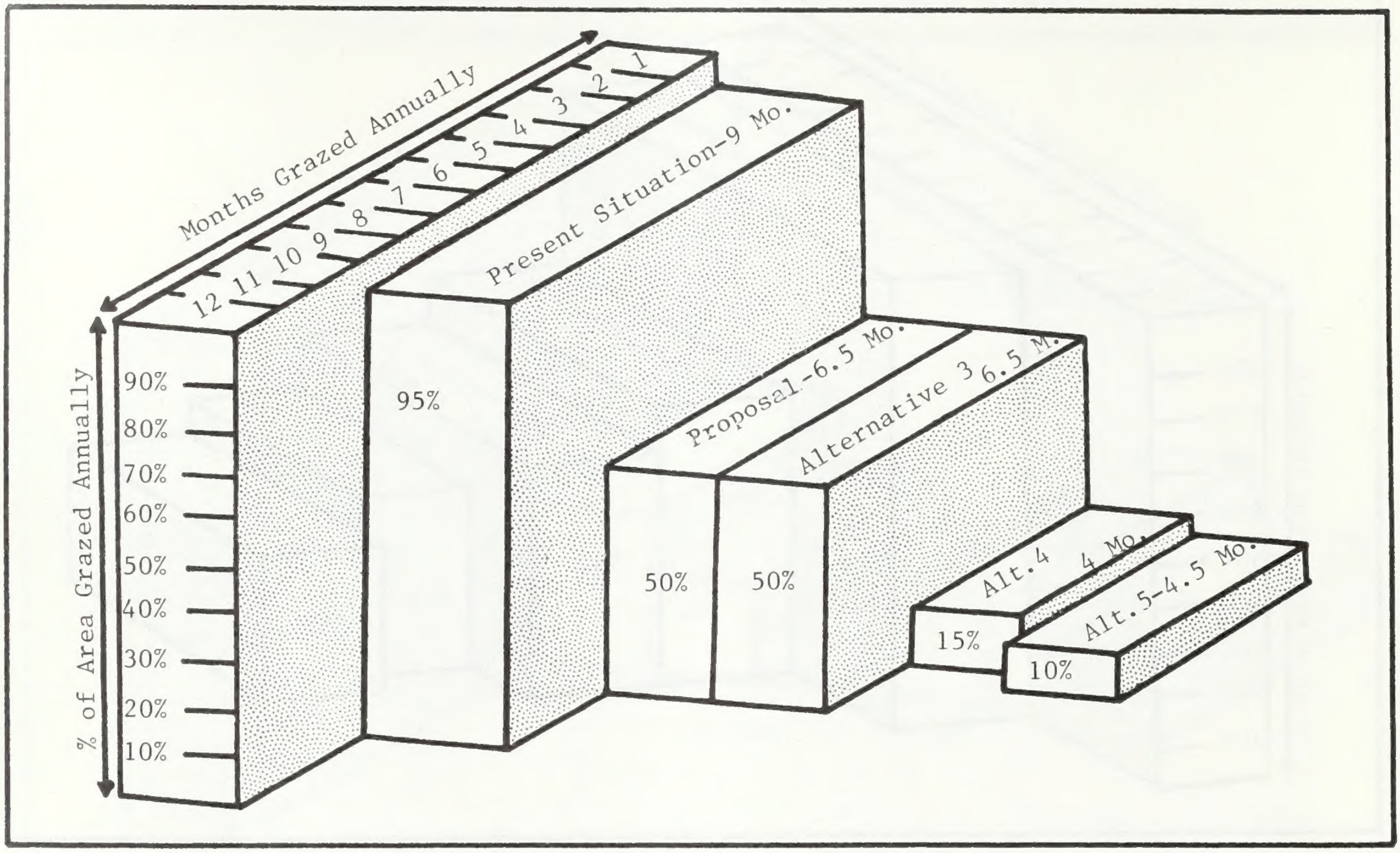
Total Area Grazed Annually



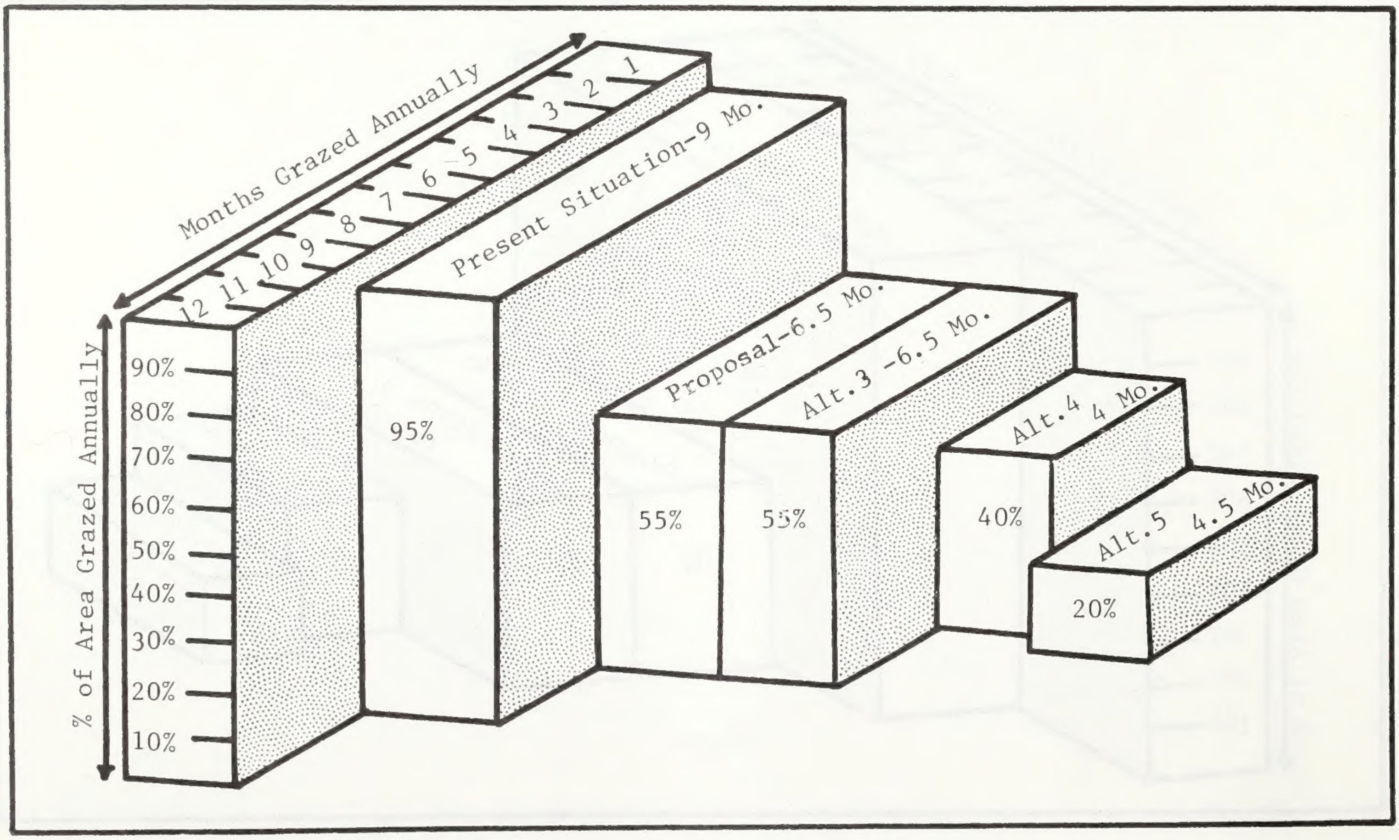
Fisheries Habitat



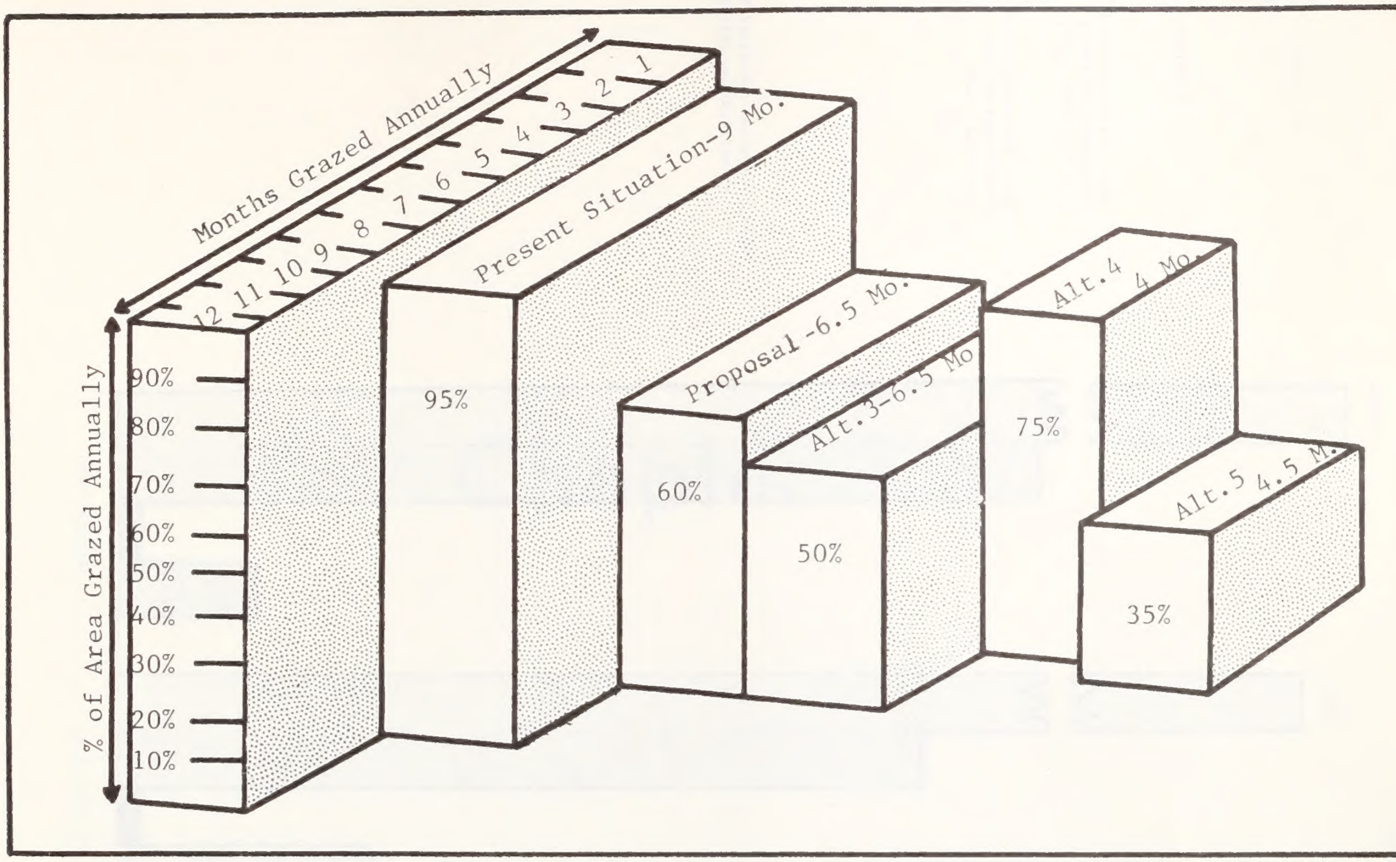
Waterfowl Habitat



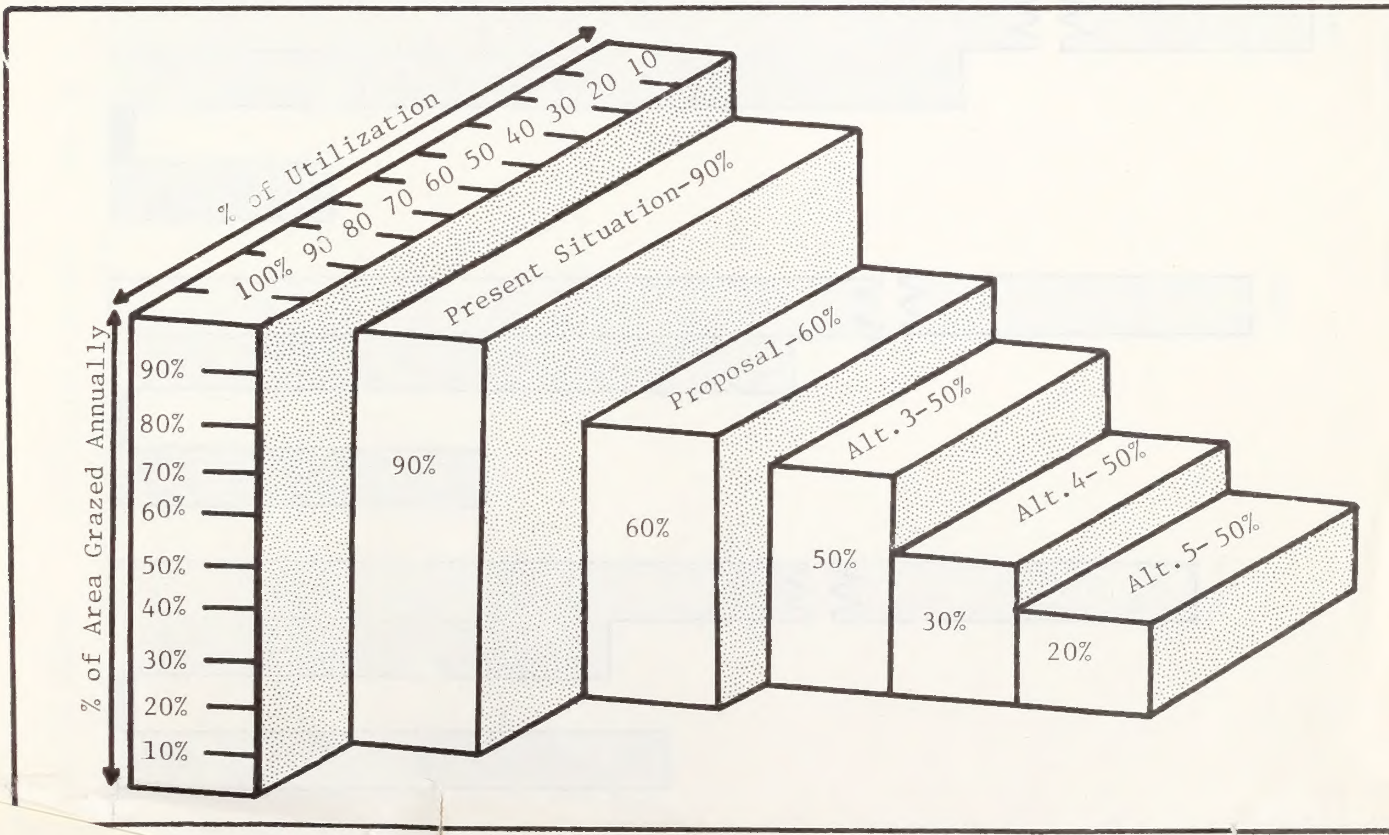
Meadows



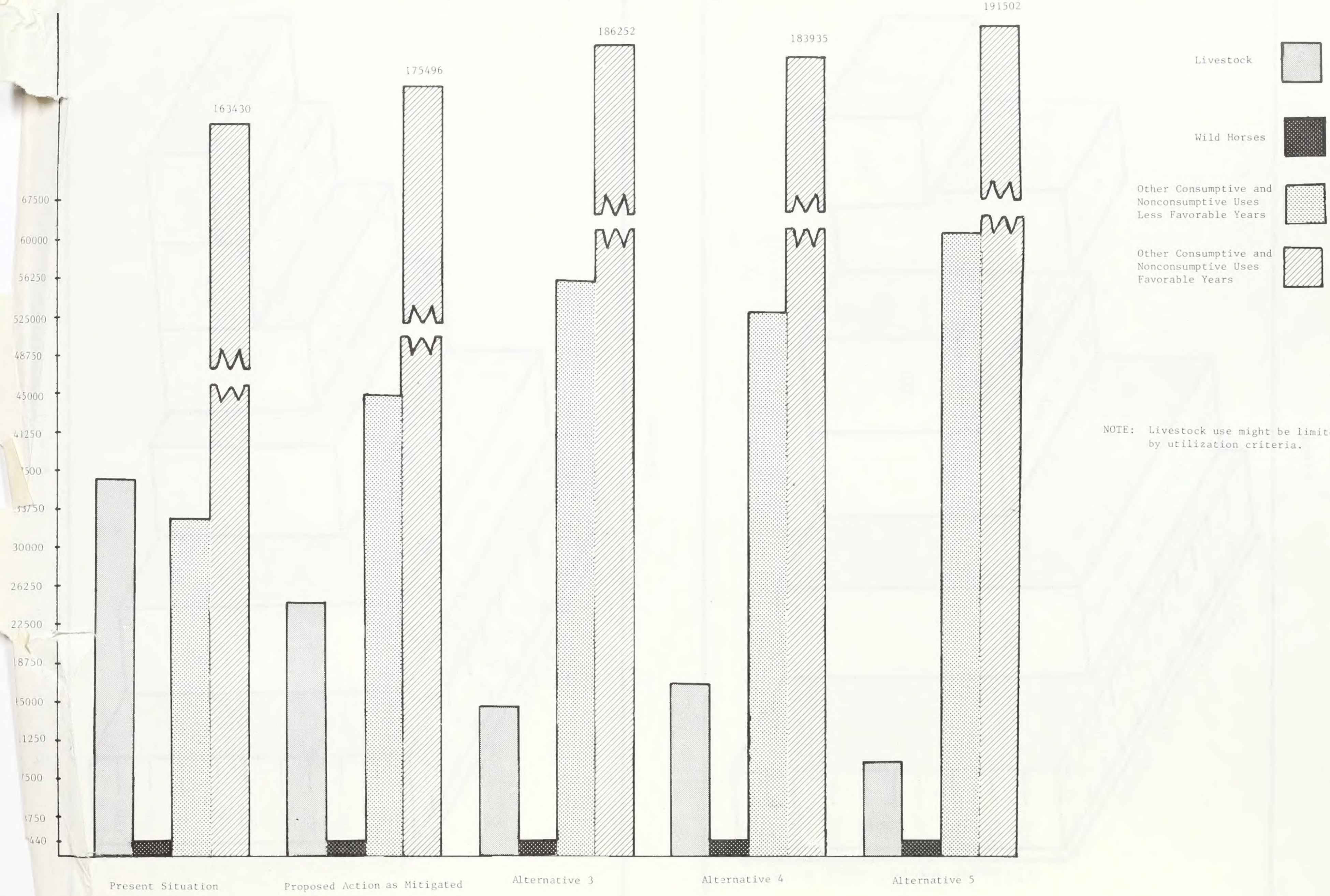
Aspen



Browse



Figures are in 1,000 pounds of air dry forage.



NOTE: Livestock use might be limited by utilization criteria.

Chapter 1

PROPOSED ACTION

Chapter 1

DESCRIPTION OF THE PROPOSED ACTION

INTRODUCTION

The proposed action is the implementation of grazing management and range facilities in the Tuledad/Home Camp Study Area.

This environmental statement has been prepared to allow a site-specific impact analysis of this action and its alternatives, and is released pursuant to the June 18, 1975, court judgment in *Natural Resources Defense Council* v. *Cecil D. Andrus, et al.*, Civil No. 1983-73.

Study Area Characteristics

The study area consists largely of public lands under jurisdiction of the Bureau of Land Management (hereafter, the BLM). Included are 900,000 acres in the Surprise Valley region of northeastern California and northwestern Nevada, 50 miles south of the Oregon border (TABLE 1-1) (MAP 1-1).

The study area lies in the following jurisdictional units:

States—California, Nevada
Counties—Modoc and Lassen (California); Washoe (Nevada)
BLM—Surprise Resource Area, Susanville District, California

Public and private lands are intermingled (MAP 1-2).

PROPOSED ACTION

Three management proposals are made:

Systematic grazing management. This management system prescribes a specific sequence of livestock grazing by designated area to accomplish management objectives. This affects 669,971 acres of intermingled public, private, and State lands that are grazed simultaneously. By agreement with the private landowners, most private land is managed by the BLM along with the public lands. Included are new systematic grazing management plans on six allotments, and the modification of existing management plans on two allotments (TABLE 1-2; MAP 1-3). (The management plans and their respective benefit-cost analyses are on file at the Susanville District Office, BLM, and at the Surprise Resource Area Office in Cedarville, California.) This level of management intensity is required to meet complex resource objectives.

Custodial grazing management. This management authorizes livestock use where only limited stipulations are required. These eight allotments (4,860 acres of public lands) are scattered land tracts which do not lend themselves to systematic management (TABLE 1-3; MAP 1-3).

Livestock grazing exclusions. To protect wildlife habitat and cultural resources, 18,920 acres are excluded from livestock grazing (TABLE 1-4; MAP 1-3).

Objectives of the Proposed Action

The major objective of this action is to induce and maintain an upward trend toward range-site potential (see Glossary) in the natural vegetative communities with ultimate achievement of site potential.

Specific objectives for all systematic grazing management plans are as follows:

(1) Initiate and maintain an upward trend toward range-site potential as defined by the appropriate range site (USDA, Soil Conservation Service, 1965).

(2) Increase canopy cover of rushes, sedges, and grasses, to 90 to 100 percent within six years on all wet meadows and riparian communities.

(3) Demonstrate a statistically significant increase in perennial grass basal cover within 12 years on study plots located in each pasture (statistically significant at the σ=.10 level, i.e., that there is at most a one in 10 chance that the apparent increase or decrease is due to chance alone).

(4) Demonstrate a statistically significant increase in vegetative cover (litter included) within six years.

(5) Increase wildlife carrying capacity and plant and animal diversity by initiating and maintaining an upward trend toward range-site potential.

(6) Improve wildlife habitat to sustain a 50-percent increase in deer numbers and a 100-percent increase in antelope numbers in the systematic management area as a whole, as set forth by the California and Nevada Departments of Fish and Game as realistic goals.

(7) Maintain preferred browse species such as antelope bitterbrush and mountain mahogany in satisfactory condition in all pastures (see APPENDIX A).

(8) Increase the livestock productive capacity of the range.

Additional specific objectives for individual allotments are as follows:

TABLE 1-1
STUDY AREA OWNERSHIP IN CALIFORNIA AND NEVADA

Ownership	Acres in California	Acres in Nevada	Total Acres	Total Percent
Public	79,915	562,196	642,111	72
State	800	-	800	Trace
Private	57,000 1/	200,000 1/	257,000	28
Study Area Total	137,715	762,196	899,911	100

1/ Estimate

TABLE 1-2
ALLOTMENTS UNDER SYSTEMATIC GRAZING MANAGEMENT

Allotment	New or Modified Plan	Public Lands (acres)	Private Lands (acres)	State Lands (acres)	Total Acres
Denio	New	23,514	1,190	-	24,704
Wall Canyon	Modified	36,474	860	-	37,334
Bare	Modified	193,048	8,680	-	201,728
Lower Lake	New	15,358	240	-	15,598
Duck Lake	New	60,617	3,651	-	64,268
Home Camp	New	142,022	15,160	-	157,182
Selic-Alaska	New	4,872	3,907	-	8,779
Tuledad	New	142,426	17,792	160	160,378
TOTAL ACRES		618,331	51,480	160	669,971

TABLE 1-3
ALLOTMENTS UNDER CUSTODIAL GRAZING MANAGEMENT

Allotment	Public Lands (acres)
Corral	1,560
Highway	1,360
Cold Spring Mountain	220
Cedar	160
Boot Lake	400
State Line	140
Clarks Valley	30
Red Rock [1/]	990
TOTAL ACRES	4,860

[1/] Total acreage in Red Rock Allotment is 1,668, including 678 privately owned acres.

TABLE 1-4
PUBLIC LANDS EXCLUDED FROM LIVESTOCK GRAZING

Area	Acres	Allotment	Resource Protected
Garden Lake	640	Tuledad	Antelope habitat
Grass Lake	400	Home Camp	Antelope habitat
Red Rock Lake	160	Tuledad	Waterfowl habitat
Snake Lake	300	Tuledad	Waterfowl habitat
Bare Creek	400 (3.0 mi.[1])	Tuledad	Riparian habitat
Barber Creek	20 (.125 mi.[1])	Tuledad	Riparian habitat
Cottonwood Creek	160 (2.0 mi.[1])	Bare	Riparian habitat
Selic Creek	5	Selic/Alaska	Riparian habitat
Alaska Creek	5	Selic/Alaska	Riparian habitat
Emerson Creek	460 (1.0 mi.[1])	Tuledad	Riparian habitat/ watershed
Cottonwood Mountain	40	Tuledad	Aspen
Cottonwood Mountain	60	Tuledad	Meadows
Springs	38	Areawide	Springs, archaeological sites
Reservoirs	14	Areawide	Reservoirs, archaeological sites
Bicondoa	10,845	Bicondoa	Bighorn sheep reintroduction area
Lower Lake	4,893	Bicondoa	Lake shore, sand dunes
North Tuledad	480	Tuledad	Deer winter range
	18,920		

1/ Linear miles along stream.

Tuledad Allotment. Provide adequate habitat to sustain not less than 100 wild and free-roaming horses.

Selic-Alaska Canyon Allotment. Demonstrate satisfactory aspen and willow reproduction and survival.

Improve visual resources by improving aspen and willow production and survival.

Bare Allotment. Provide adequate habitat to sustain not less than 50 head of wild and free-roaming horses in the Fox-Hog Mountain Wild Horse Management Area.

Wall Canyon. Maintain the seeding in a stable condition.

Purpose of and Need for the Proposed Action

The purpose of the proposed action is to restore rangeland vegetation to site potential to increase the production of renewable resources.

Components of the Proposed Management Program

(1) Systematic grazing management
(2) Custodial grazing management
(3) Grazing exclusions
(4) Facilities to implement proposal
(5) Reseeding tests

SYSTEMATIC GRAZING MANAGEMENT

A plant's health and survival depend on its abilities to synthesize and store food, form vegetative structures for renewal of top growth, maintain a healthy root system, and produce reproductive organs (Stoddart, et al., 1975). Grazing, through removal of photosynthetic leaf tissue, interferes with these processes. Systematic grazing management is designed to offset these impacts by providing rest.

All allotments receiving systematic grazing management, except the Selic-Alaska Canyon Allotment, would have a three-pasture grazing system applied. This grazing system was proposed to meet resource objectives.

The Selic-Alaska Canyon Allotment would have a two-pasture grazing system applied. The presence of large amounts of intermingled private land, coupled with complex land ownership patterns, precluded the development of a more sophisticated grazing management system on this allotment.

With the exception of the Selic-Alaska Canyon Allotment, each allotment would be divided into three pastures. Bare Allotment would be divided into two sets of three pastures.

Livestock would be rotated from pasture to pasture systematically to provide each pasture a periodic rest from grazing.

The graze/rest formula shown in FIGURE 1 would be applied to these allotments.

Forage species selected to determine seedripe dates are listed below for each allotment:

Allotment	*Species*	*Seedripe Period*
Denio	Idaho fescue	08/01 to 08/20
Wall Canyon	Bluebunch wheatgrass	07/15 to 08/15
	Crested wheatgrass	07/01 to 07/31
Bare	Bluebunch wheatgrass	07/15 to 08/15
Lower Lake	Bluebunch wheatgrass	07/15 to 08/15
Duck Lake	Bluebunch wheatgrass	07/15 to 08/15
Home Camp	Bluebunch wheatgrass	07/15 to 08/15
Tuledad	Bluebunch wheatgrass	07/15 to 08/15

The seedripe date would be established annually by the Area Manager from actual plant growth.

The sequence of pasture rest is shown in FIGURE 2.

In the first year, the livestock would start grazing in Pasture 1 (Treatment A). Pasture 2 would be rested until seedripe time, when it would become available to the livestock (Treatment B). Pasture 3 would be rested yearlong (Treatment C). Thus, each pasture would receive the same sequence of rest treatments.

Selic-Alaska Canyon would be divided into two pastures. The graze/rest formula in FIGURE 3 would be applied. The sequence of rest for the pastures is shown in FIGURE 4.

In the first year, Pasture 1 would be grazed throughout the season and Pasture 2 would be rested yearlong. In the second year, the reverse would occur. The process would then be repeated.

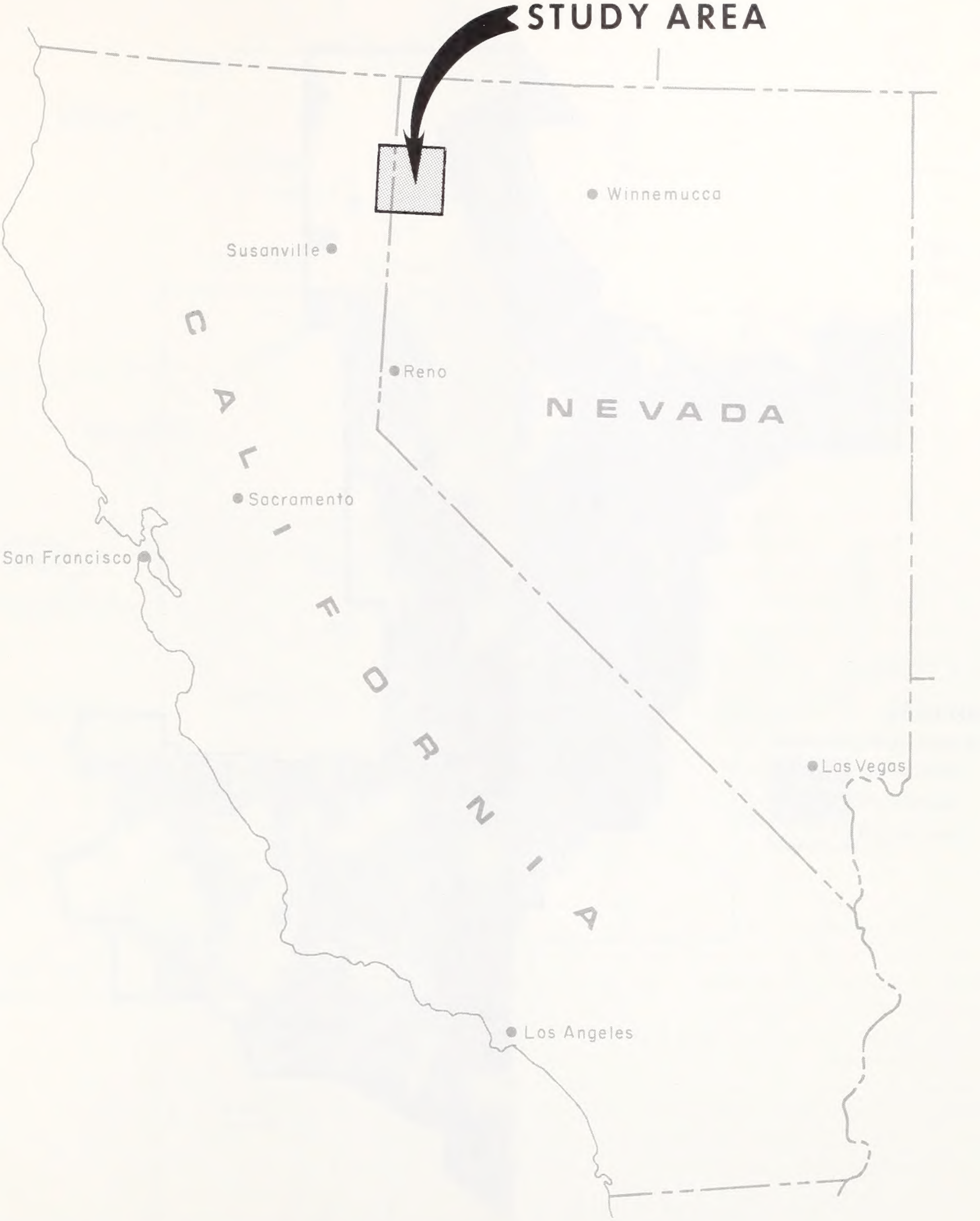
Proposed Level of Livestock Use

Management would be started with the level of livestock use currently (1977) licensed (see TABLE 1-6).

The Tuledad/Home Camp area has been grazed for over 100 years. Grazing use has been adjusted by the Taylor Grazing Act and two range adjudications (TABLE 1-5).

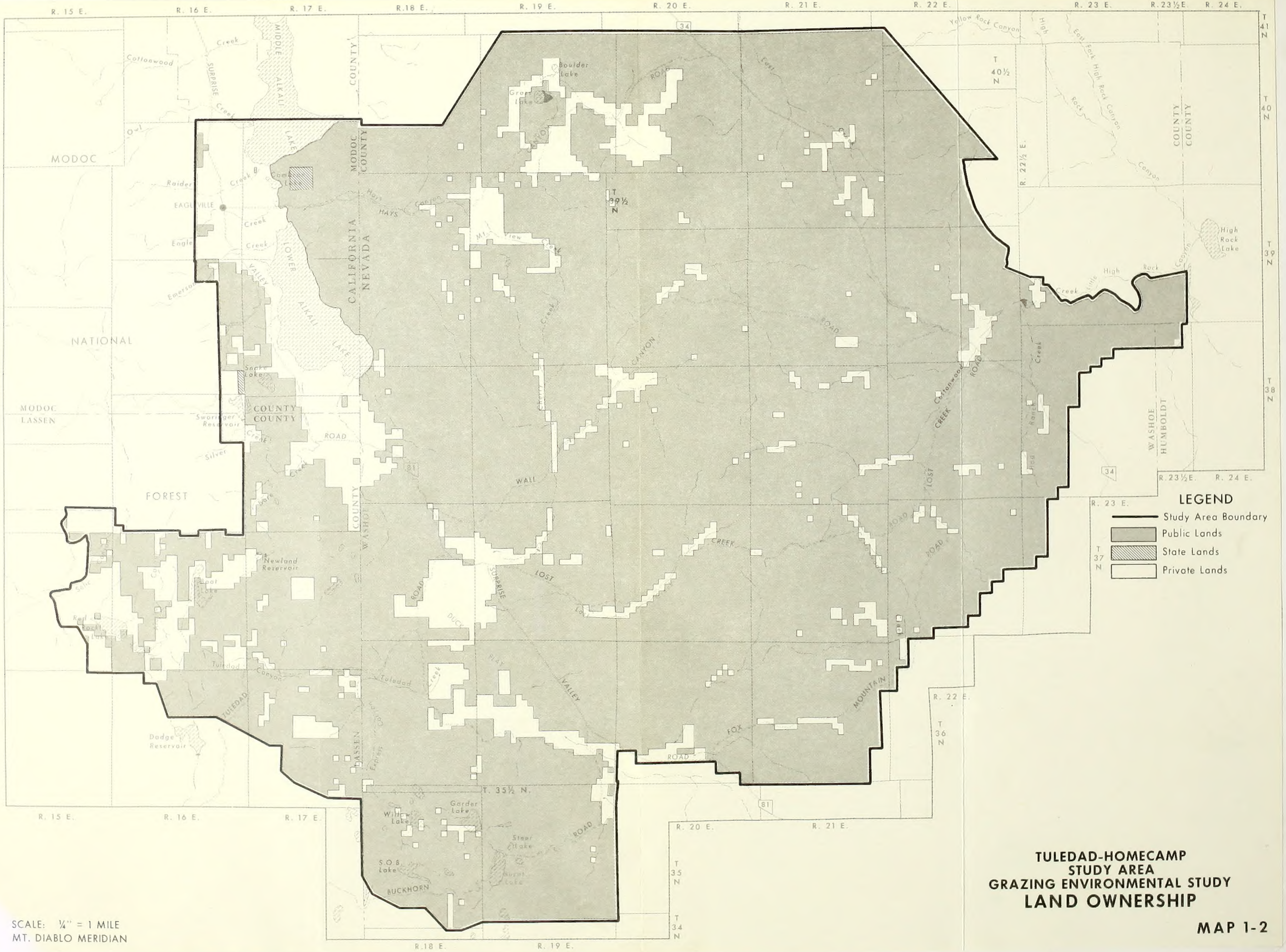
The last adjudication (1965-1968) was based upon a 1961 range survey used to estimate livestock carrying capacity. Future management needs were to be determined after analysis of range condition and trend.

In 1976, range condition and trend studies showed range condition to be generally fair.



TULEDAD-HOMECAMP
STUDY AREA
GRAZING ENVIRONMENTAL STUDY
GENERAL LOCATION

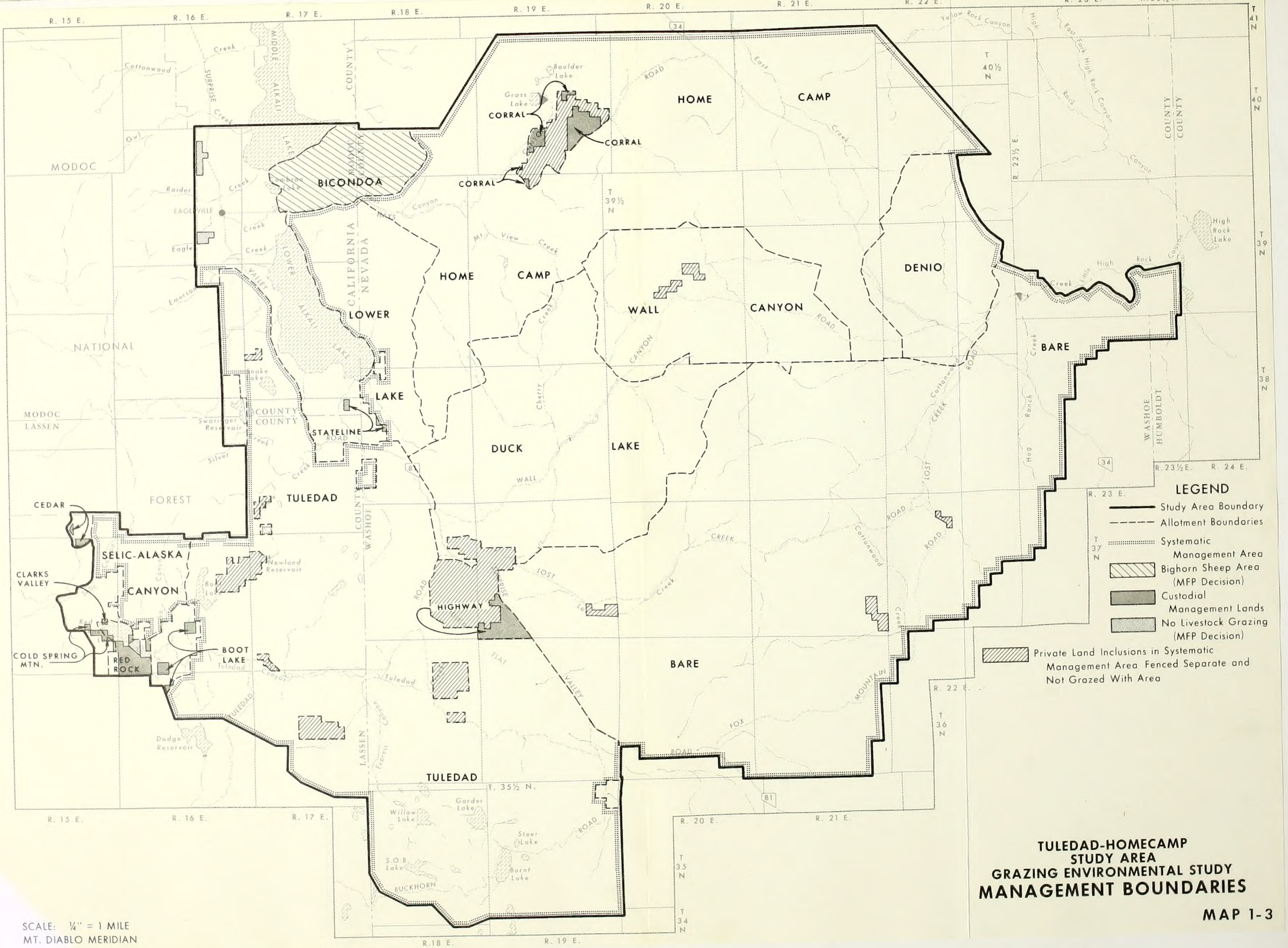
MAP 1-1



SCALE: ¼" = 1 MILE
MT. DIABLO MERIDIAN

TULEDAD-HOMECAMP
STUDY AREA
GRAZING ENVIRONMENTAL STUDY
LAND OWNERSHIP

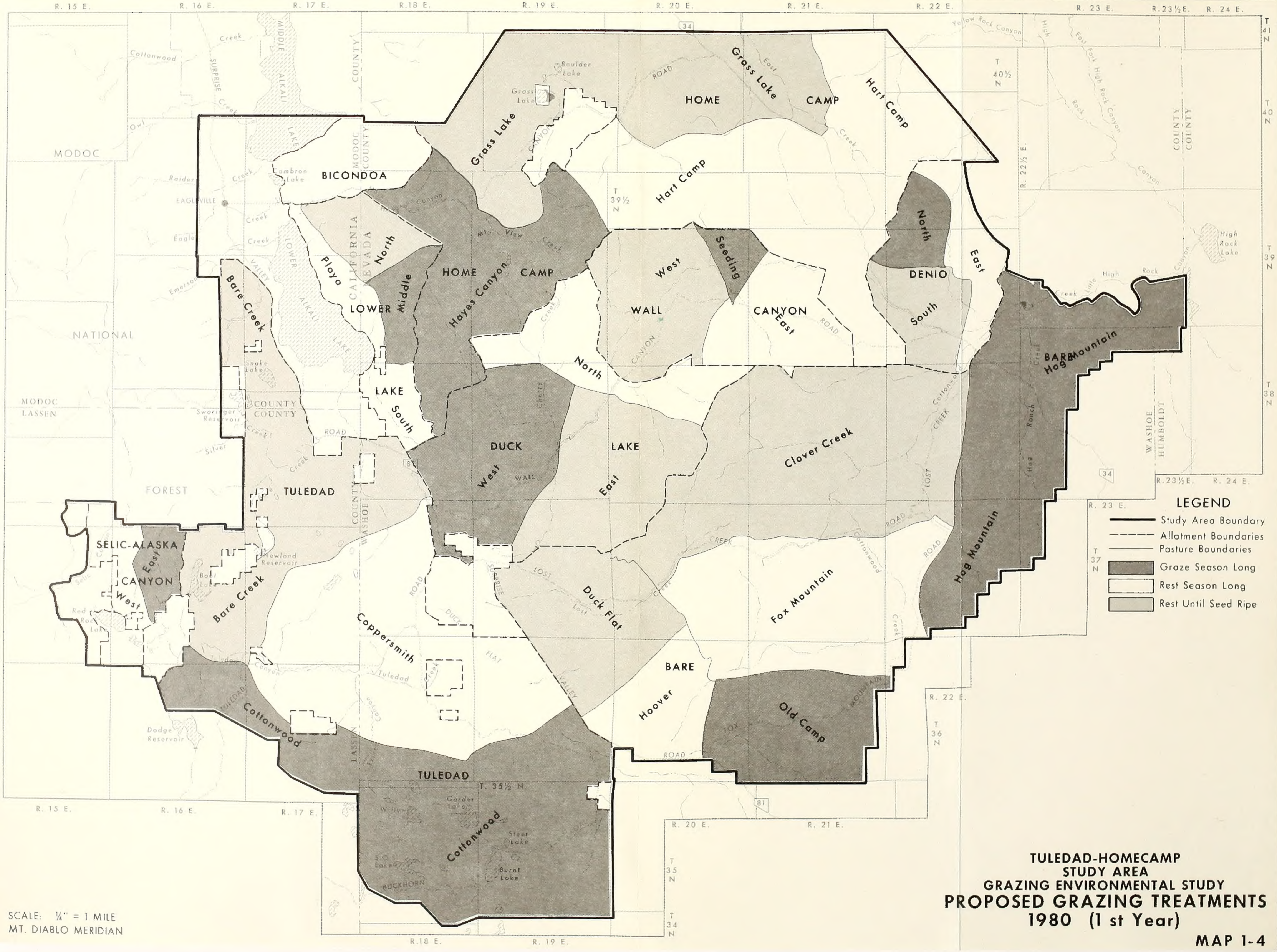
MAP 1-2



TULEDAD-HOMECAMP STUDY AREA GRAZING ENVIRONMENTAL STUDY

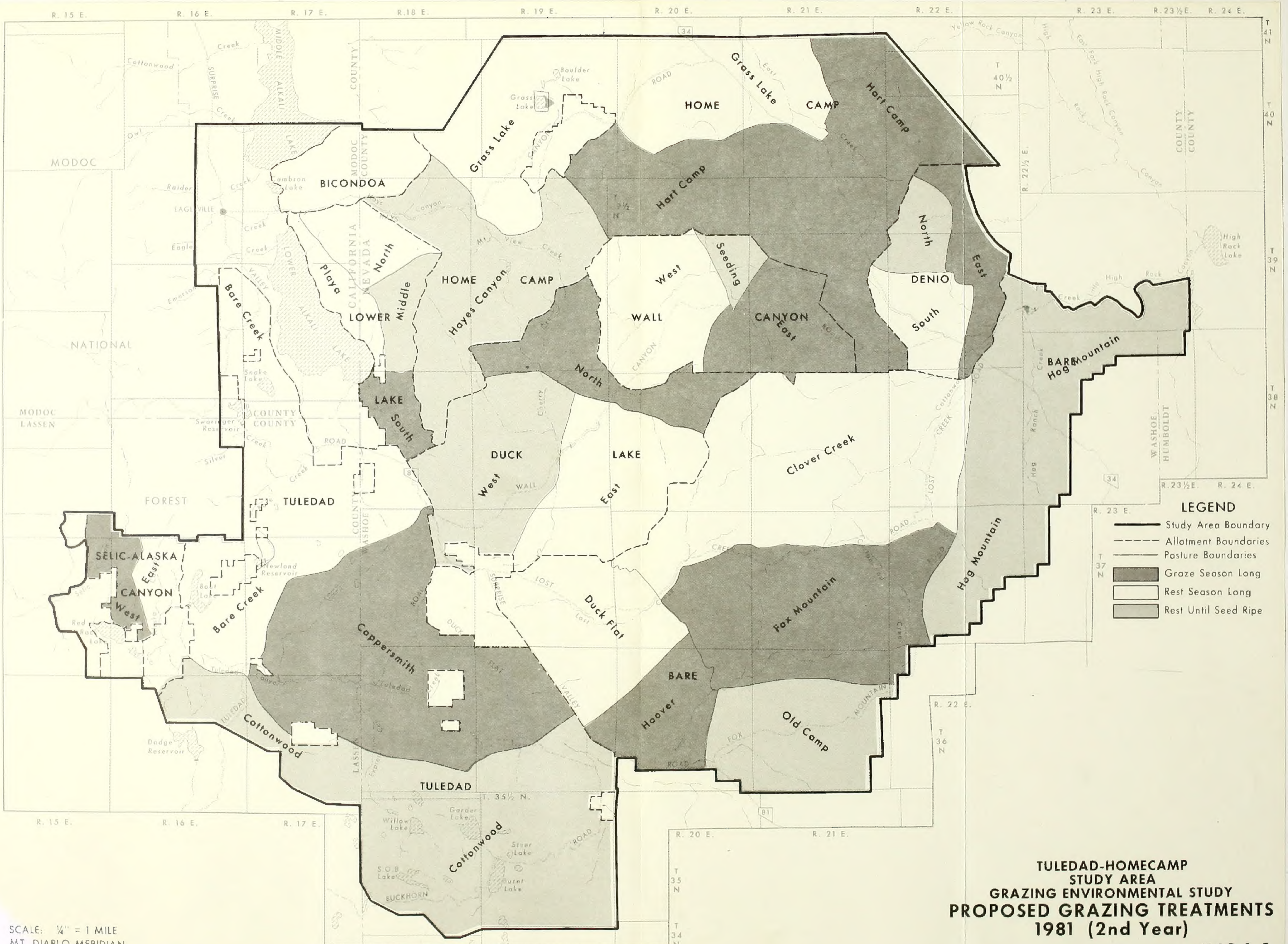
MANAGEMENT BOUNDARIES

MAP 1-3



TULEDAD-HOMECAMP
STUDY AREA
GRAZING ENVIRONMENTAL STUDY
PROPOSED GRAZING TREATMENTS
1980 (1 st Year)

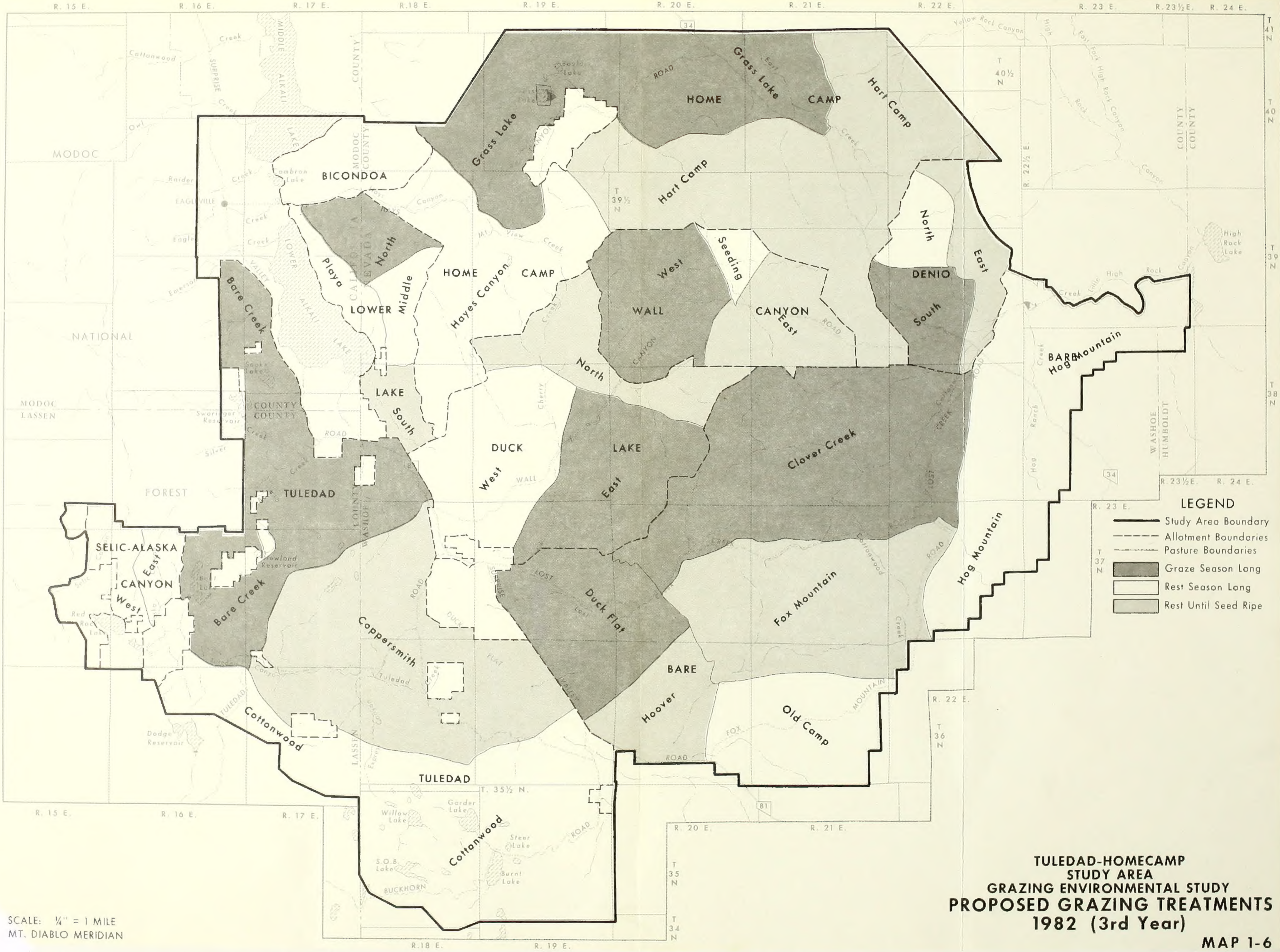
MAP 1-4



SCALE: ¼" = 1 MILE
MT. DIABLO MERIDIAN

TULEDAD-HOMECAMP
STUDY AREA
GRAZING ENVIRONMENTAL STUDY
PROPOSED GRAZING TREATMENTS
1981 (2nd Year)

MAP 1-5



SCALE: ¼" = 1 MILE
MT. DIABLO MERIDIAN

TULEDAD-HOMECAMP
STUDY AREA
GRAZING ENVIRONMENTAL STUDY

PROPOSED GRAZING TREATMENTS
1982 (3rd Year)

MAP 1-6

FIGURE 1-1
Graze/Rest Formula

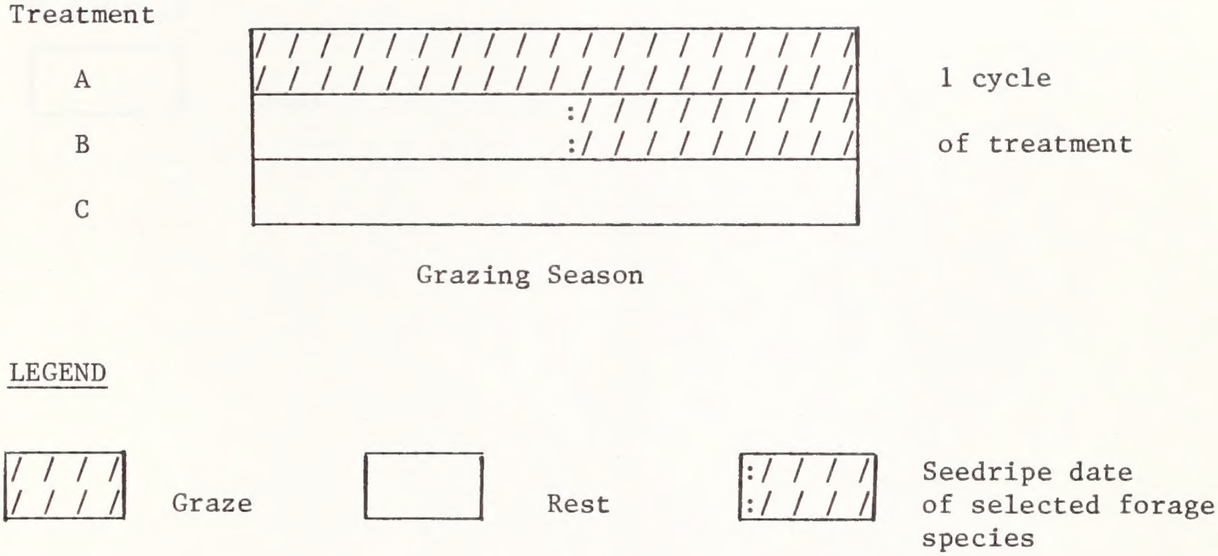


FIGURE 1-2
Pasture Graze/Rest Schedule

	Treatments		
Year	Pasture 1	Pasture 2	Pasture 3
First	A	B	C
Second	B	C	A
Third	C	A	B
Fourth	Repeat sequence of treatments		

FIGURE 1-3
Graze/Rest Formula for Selic-Alaska Canyon

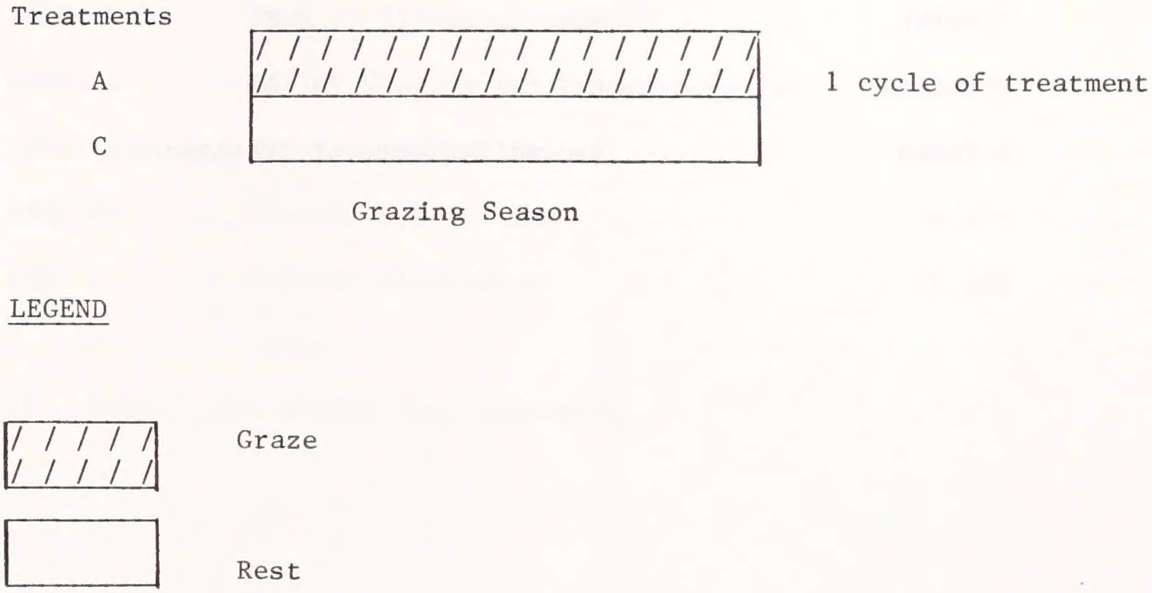


FIGURE 1-4

Pasture Graze/Rest Schedule for Selic-Alaska Canyon Allotment

	Treatments	
Year	Pasture 1	Pasture 2
First	A	C
Second	C	A
Third	Repeat sequence of treatments	

TABLE 1-5
GRAZING HISTORY OF STUDY AREA
(Sheep, Cattle and Horses)

Date	Significance of Date	Approximate[1/] AUMs
1875-80	Peak of livestock numbers	750,000
1929-34	Taylor Grazing Act Priority Period	155,000
1949-52	First Adjudication	90,000
1965-68	Second Adjudication	50,000
1977	Current Allocation	46,000

1/ Animal unit months (see Glossary).

TABLE 1-6
PROPOSED LIVESTOCK USE

	AUMS							TIME		
	Public Lands			Private Lands				Treatment A	Treatment B	Treatment C
Allotment	Cattle	Sheep	Subtotal	Cattle	Sheep	Subtotal	Total	Pasture	Pasture	Pasture
Denio	1,542	-	1,542	91	-	91	1,633	4/16 to Seedripe	Seedripe to 10/15	None
Wall Canyon	2,609	-	2,609	25	-	25	2,634	4/16 to Seedripe	Seedripe to 9/15	None
Bare	14,737	-	14,737	231	-	231	14,968	4/01 to Seedripe	Seedripe to 10/31	None
Lower Lake	698	-	698	-	-	-	698	3/16 to Seedripe	Seedripe to 8/15	None
Duck Lake	3,284	-	3,284	327	-	327	3,611	4/01 to Seedripe	Seedripe to 8/15	None
Home Camp	8,851	-	8,851	910	-	910	9,761	4/01 to Seedripe	Seedripe to 9/15	None
Selic-Alaska	285	255	540	363	336	699	1,239	7/01 to 9/30		None
Tuledad	7,729	2,184	9,913	860	174	1,034	10,947	4/01 to Seedripe	Seedripe to 10/15	None
TOTAL	39,735	2,439	42,174	2,807	510	3,317	45,491			

Meadows, streams, and aspen stands tended to be degraded. Range trend was static or slightly upward (see Chapter 2, Vegetation).

Because range conditions are generally fair and trend is static or upward, it is felt that livestock numbers are within the carrying capacity of the range. Degradation of meadows, streams, and aspen stands results from poor distribution and management of livestock, rather than overstocking. Reduction in livestock numbers would not prevent livestock concentrations in such areas.

Carrying capacity may change with proposed management. This change can accurately be determined only after management is in effect and results observed.

A comparison of annual herbage production, livestock forage production, and livestock, wild horse and wildlife forage requirements are shown in TABLE 1-7.

Systematic Management

INITIAL CYCLE

During the first cycle, a phase-in period would be provided. Livestock would be turned out in Pasture 1. If utilization reaches current use levels before seedripe, then livestock would be allowed to drift into Pasture 2. If use reaches current levels before the end of the grazing season in Pasture 2, then Pasture 3 would be opened and livestock allowed to graze until termination of licensed use. Pastures 2 and 3, therefore, would receive grazing deferments, rather than amount of rest prescribed by the grazing formula.

If current use levels are not reached by the appropriate seedripe dates, the prescribed grazing formula would be followed.

At the end of the phase-in period, actual use and utilization would be examined and adjustments made where necessary. For example, if a pasture under systematic grazing management is planned to support 30 cows for 150 days, and during the phase-in period it supports them for only 120 days, then a 20-percent reduction in numbers or a 20-percent reduction in season of use would be imposed. Grazing would be started at the adjusted level during the fourth year. At the end of three years, initial modifications would have been made to insure functional operation of the grazing formulas.

In subsequent cycles, if additional refinement is needed, it would be similarly calculated and imposed.

SUBSEQUENT CYCLES

Although during the initial cycle livestock use would be adjusted to pasture capacity, achievement of individual resource objectives as a result of grazing management would not be assured. Therefore, monitoring of changes in resource conditions to determine progress toward those objectives is required.

Monitoring Systems

Adjustment of management based on data collected by the monitoring systems allows orderly progress toward management objectives. Changes in vegetation, water, fisheries, wildlife, wild horses, and livestock would be monitored.

Since many variables affect range conditions and the response of a particular range to grazing management, it is not possible at this time to state specific actions that would be taken if vegetative conditions do not respond satisfactorily. A downward trend in a particular habitat type could be caused by one or a combination of several of the following factors: improper grazing formula, i.e. inadequate or improperly sequenced rest treatments, improper season of use, excess livestock numbers, excess wildlife or wild horse use, improper class of livestock, fluctuating weather condition, disease, rodent or insect infestations, or other causes. Careful analysis of all factors must be considered prior to making adjustments in a management system.

The following examples show possible courses of action which might be taken if management objectives are not being met.

Assume that after two complete grazing cycles the monitoring system showed that an important deer browse range in the Tuledad Allotment was in poor condition with a downward trend. After analysis of all factors affecting the area, it was determined that bitterbrush plants were not receiving adequate rest from grazing to restore food reserves. Livestock use during the "A" and "B" treatments combined with annual summer and fall deer use had resulted in 90 percent utilization of most bitterbrush plants during these years. A remedial course of action which could be taken in this situation would be to fence that portion of the range receiving heavy utilization and exclude livestock grazing. Monitoring would be continued to assess the effectiveness of the action and allow additional changes to be made if necessary.

TABLE 1-7
TOTAL ANNUAL HERBAGE AND LIVESTOCK-FORAGE PRODUCTION, AND TOTAL ANNUAL LIVESTOCK, WILD HORSE, AND OTHER CONSUMPTIVE AND NONCONSUMPTIVE FORAGE REQUIREMENTS

	Herbage Production 1/		Livestock Forage Production 1/		Forage Requirements 1/		Livestock Forage Remaining for Other Consumptive and Nonconsumptive Uses 3/		Herbage Remaining for Other Consumptive and Nonconsumptive Uses 3/	
	Less Favorable Years	Favorable Years	Less Favorable Years	Favorable Years	Cattle/ Sheep 2/	Wild Horses and Burros	Less Favorable Years	Favorable Years	Less Favorable Years	Favorable Years
Denio	8,992	17,662	2,518	6,962	1,306	0	1,212	5,656	7,686	16,356
Wall Canyon	17,325	34,020	4,882	12,427	2,107	0	2,775	10,320	15,218	31,913
Bare	81,771	155,163	20,752	56,497	11,974	480	8,298	44,043	69,317	142,709
Lower Lake	5,415	8,994	622	2,326	558	0	64	1,768	4,857	8,436
Duck Lake	25,180	47,281	5,192	16,655	2,889	0	2,303	13,766	22,291	44,392
Home Camp	65,666	129,287	17,937	46,477	7,809	0	10,128	38,668	57,857	121,478
Selic-Alaska Canyon	6,042	11,482	1,580	4,717	991	0	589	3,726	5,051	10,491
Tuledad	78,084	148,603	15,959	54,369	8,758	960	6,241	44,651	68,366	138,885
TOTAL	288,475	552,492	69,442	200,430	36,392	1,440	31,610	162,598	250,643	514,660

1/ One thousand pounds of dry air herbage.

2/ Based on proposed livestock use, shown in TABLE 1-6.

3/ These columns represent forage/herbage remaining after livestock and wild horse forage requirements have been satisfied. The amounts of vegetation expressed for each allotment would be available for other uses such as aesthetics, wildlife requirements, and watershed protection.

Adapted from SCS range-site descriptions and BLM's 1976 vegetation inventories.
See APPENDIX I for calculation procedures.

As another example, assume that after two cycles of grazing on the Home Camp Allotment onsite vegetation monitoring has shown that the aspen habitat type in the Hays Peak Area has continually had poor reproduction and seedling establishment. It was primarily attributed to heavy grazing and soil compaction by trampling. One possible action that could be taken in this instance would be to exclude livestock grazing from those key stands. This would be accomplished by temporary fencing of such areas until plant vigor and sufficient reproduction occurred to reverse the trend so that the aspen stands would maintain a highly reproductive condition. Monitoring of the fenced areas on a seasonal basis would provide the ability to determine the appropriate length of time necessary for exclusion prior to continuing livestock grazing.

VEGETATION MONITORING SYSTEM

Vegetation would first be stratified by habitat types to determine long-term vegetative trends (see APPENDIX B). Changes in the vegetative character of every habitat type would be examined at six-year intervals. Based on vegetative response to management, livestock numbers, season of use, intensity of use, area of use and other factors may be adjusted to maintain progress toward site potential.

To assess more immediate responses to specific grazing treatments, monitoring would be further stratified by pastures within allotments. These studies would focus on utilization and frequency of key species on key areas. Key areas and key species for each allotment would be selected prior to implementation of the grazing system and after on-the-ground consultation with the livestock operators, Fish and Game Departments and any other interested parties. Utilization and frequency determinations would be made every year on each pasture in each allotment. These data would allow annual adjustments in livestock use.

Vegetation monitoring would be further stratified by crucial wildlife habitat. Meadows, aspen, white fir, browse ranges and waterfowl habitat would be monitored through a system of transects and ground and aerial infrared photography. Most stands (sampling units) would be monitored at the end of each grazing season. Those stands located in areas which receive heavy wildlife or wild horse use would be monitored throughout the remainder of the year to assess impacts of use by these species. Changes in the density of trees, would be monitored every third year. Representative stands have been located in each allotment. These data would be used to assess the need for management adjustments based on changes in key wildlife habitat components and management objectives for these components. Changes in livestock, wild horse and wildlife use of these habitat areas may be necessary depending upon conditions and their cause.

SOIL MOVEMENT MONITORING

Monitoring of soil movement will be conducted on the most extensive soil series and on those exhibiting the greatest potential for significant loss. Guidelines and procedures for setting transects and monitoring progressive soil movement will conform to those contained in "The Vigil Network" (Emmet, 1965). Hillslope erosion will be determined by a system of pins and washers and channel change measurements will be accomplished by lengths of chain and cross-section recordings as prescribed in "The Vigil Network." Where possible, recordings will be taken concurrently with precipitation and runoff events.

WATER MONITORING SYSTEM

To obtain information on changes in water quality and aquatic organisms, two periods of sampling, one at extreme low flow and one at peak flow, will be conducted each year (see APPENDIX C). Physical, microbiological, and chemical characteristics would be sampled.

Species and number of bottom flora and fauna including algae and insects as well as presence and numbers of aquatic vetebrates encountered would also be recorded.

FISHERIES MONITORING SYSTEM

Stream flow and temperature would be monitored at permanently established stations on Bare, Barber, and Selic Canyon Creeks. Monitoring would be synchronized with water-quality monitoring (see APPENDIX C and D).

A stream survey would be performed annually to evaluate fish species composition and abundance, the condition of bottom substrate, and the recovery rate of both aquatic and streamside vegetation. Permanent transects would be established in both stream enclosures and on the streams outside of the enclosures where systematic livestock grazing would be practiced.

Results of these studies would be applied to achieve fisheries objectives.

WILDLIFE MONITORING

The BLM and the Nevada and California Departments of Fish and Game would monitor wildlife populations for big game animals.

The BLM would establish monitoring systems to measure the change in numbers of species occurring in habitat types as a result of the proposed action. Sampling would be done before implementation and at three-year intervals thereafter. Monitoring systems would include:

Bird Surveys. Enlen Method of Population Density Transects—year-round Sage grouse and quail brood surveys during the summer; direct count waterfowl surveys, early to mid-summer.

Mammal Surveys. Small mammal trapping by habitat types. Sampling would be directed toward areas where vegetation monitoring would be conducted and in areas where water development would be installed.

Wild and Free-Roaming Horses. A census of wild horse populations would be aerially taken semi-annually.

Through the monitoring process, systematic management would be subject to refinement to meet management objectives.

STIPULATIONS FOR SPECIFIC ALLOTMENTS

Selic-Alaska Canyon Allotment. If satisfactory aspen and willow reproduction and survival have not been achieved within six years, the grazing qualifications would be terminated or the grazing system will be modified so that reproduction and survival will be achieved.

No sheep trailing would be allowed in the pasture receiving Treatment C (yearlong rest). Sheep trailing to the Modoc National Forest during the summer and to Clarks Valley in the fall must be made in the pasture receiving Treatment A.

Tuledad Allotment. Sheep use would be made concurrently with cattle use in pastures scheduled for grazing. Sheep would be permitted to trail across rest pastures with the fastest reasonable speed (3-5 miles a day with lambs/7-8 miles a day without lambs) to reach use pastures if no other route is available.

CUSTODIAL GRAZING MANAGEMENT

On all custodial allotments except Red Rock, the BLM would not regulate numbers of stock or periods of use. The public lands affected are scattered isolated tracts intermingled and grazed with large acreages of private land. No values have been identified to warrant a more positive action. The licensees would be billed for estimated animal unit months (AUMs) available (TABLE 1-8).

On the Red Rock Allotment, the proposed action would be to continue to allow season-long grazing but to regulate numbers of stock and period of use (TABLE 1-9). This is proposed because the allotment contains approximately 60 percent public lands but is too small and isolated to implement systematic grazing management. TABLE 1-9 provides the details on regulation and level of use of the allotment.

GRAZING EXCLUSIONS

Selected archaeological sites, meadows, streams, antelope kid-rearing areas, deer range, a bighorn sheep reintroduction area, springs, aspen stands, and reservoirs would be fenced to exclude livestock (TABLE 1-10).

FACILITIES TO IMPLEMENT THE PROPOSAL

Facilities on public lands needed to implement the proposed action include fencing, cattleguards, spring developments, reservoirs, wells, windmills, pipelines, livestock trails, reseeding tests, and monitoring systems (TABLE 1-11; MAP 1-8).

Cost sharing for construction and maintenance of these facilities between BLM and ranchers would follow the guidelines provided in the Susanville District policy statement (APPENDIX E).

Fences

All fences would be constructed to BLM Manual Chapter 1737 Type 1 specifications for antelope and deer. All pasture fences would be three-strand. The bottom strand would be smooth wire raised 18 inches from the ground. The gap between the top and second strands would be 12 inches. Total height would not exceed 38 inches. Protective fences around pasture springs, reservoirs, and crucial critical wildlife habitat areas excluded from grazing would be four-strand not exceeding 42 inches in height.

Fences would be constructed with gray steel posts at approximately 16-foot intervals with a twisted wire stay between each post. Wooden posts would be used on corners, gates, and stretch panels.

The segments designated on MAP 1-8 would be constructed with highly visible, colored posts to minimize wild horse conflicts.

TABLE 1-8
ESTIMATED FORAGE ON PUBLIC LANDS IN SEVEN CUSTODIAL ALLOTMENTS[1]

Allotment	AUMS
Corral	88
Highway	25
Cold Spring Mountain	25
Cedar	10
Boot Lake	42
State Line	5
Clarks Valley	3
TOTAL	198

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[1] Source: SCS Range Survey, 1961.

TABLE 1-9
LIVESTOCK USE IN RED ROCK CUSTODIAL ALLOTMENT

Number of Licensees	Class of Livestock	Period of Use	Number of Livestock	Maximum Days' Use	Maximum AUMs Public	Maximum AUMs Private	Total
4	Cattle	6/17-6/30	216	14	66	36	102
		9/01-9/30	66	30	66	-	66

TABLE 1-10
FACILITIES TO EXCLUDE LIVESTOCK GRAZING[1/]

Allotment	Area	Number of Exclosures	Miles of Fence
Tuledad	Garden Lake	1	4.0
	Red Rock Lake	1	1.0
	Snake Lake	1	3.0
	Bare Creek	2	3.0
	Barber Creek	1	1.0
	Cottonwood Creek	1	4.0
	Emerson Creek	1	1.0
	Cottonwood Mountain	3	2.0
Home Camp	Grass Lake	1	4.0
Selic-Alaska Canyon	Selic Creek	1	1.0
	Alaska Creek	1	1.0
Areawide	Springs	38	5.0
	Reservoirs	7	2.0
TOTAL		59	32.0

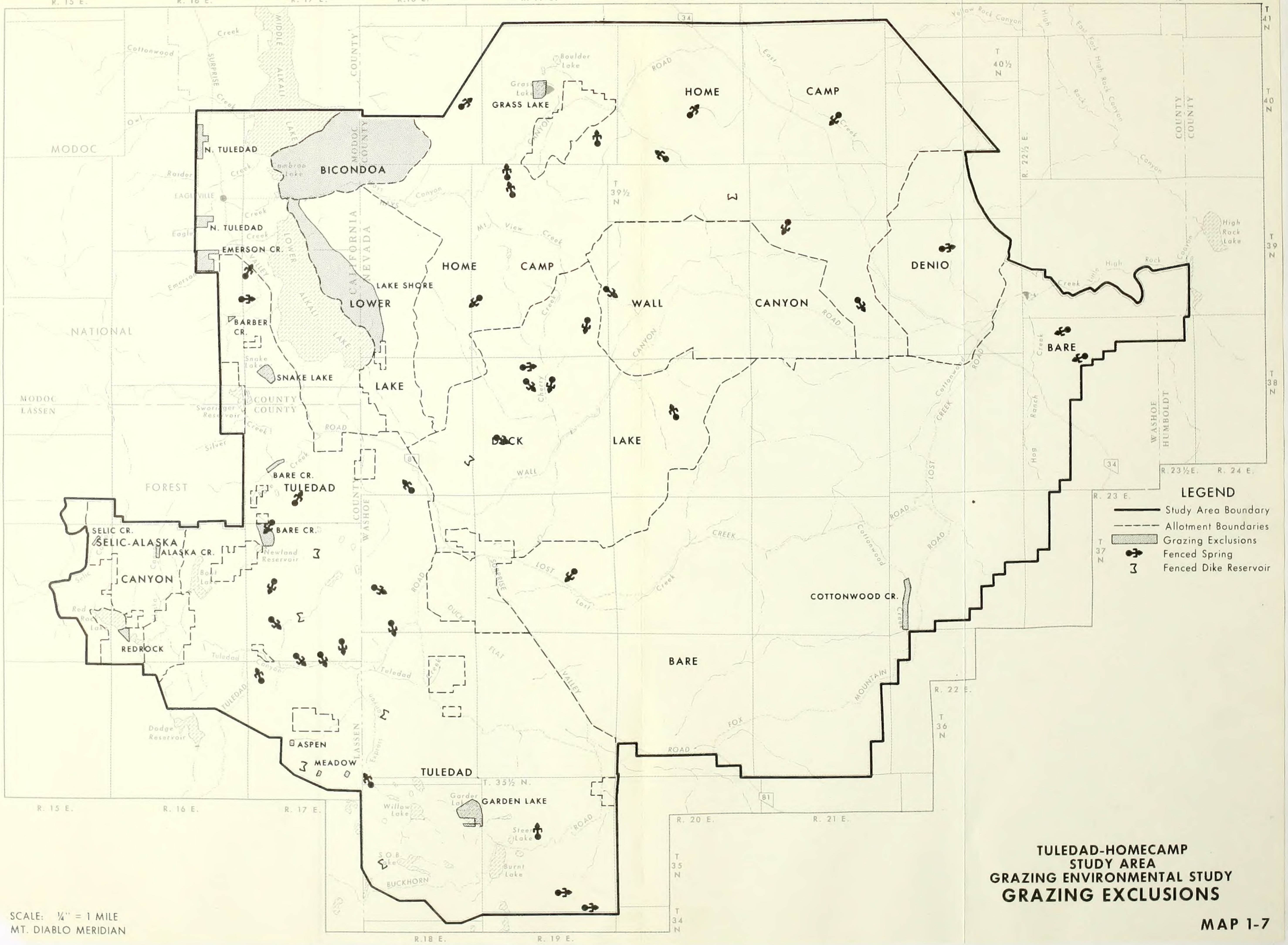
1/ Estimated cost: $70,500.

TABLE 1-11
FACILITIES AND COSTS TO IMPLEMENT PROPOSAL

		FACILITIES							
Item	Allotment	Springs[1]	Reservoirs[1]	Wells[1]	Pipelines[1]	Pasture Fences[2]	Cattleguards[1]	Livestock Trails[2]	Cost
Facilities	Denio	1		1		10 new 2 remove	3		$ 33,600
	Wall Canyon	1							2,400
	Bare	3	3	2		5			40,400
	Lower Lake			4		15			46,000
	Duck Lake	6	7		2	14	3	2	78,700
	Home Camp	10	8	3	12	23	3		147,100
	Selic-Alaska Canyon	-	-	-	-	-	-	-	--
	Tuledad	17	46	2		32	3	2	239,600
	Red Rock	-	1	--	-	-	-	-	2,000
	Facilities Subtotal	38	65	13	14	99 New 2 remove	12	4	589,800
Grazing Exclusions (fences)	Areawide								70,500
Test Seedings	Bare, Home Camp Tuledad								4,000
Monitoring (annual) (est.)	Areawide								30,000
TOTAL									$694,300

1/ Number of each item per allotment.

2/ Total miles per allotment.

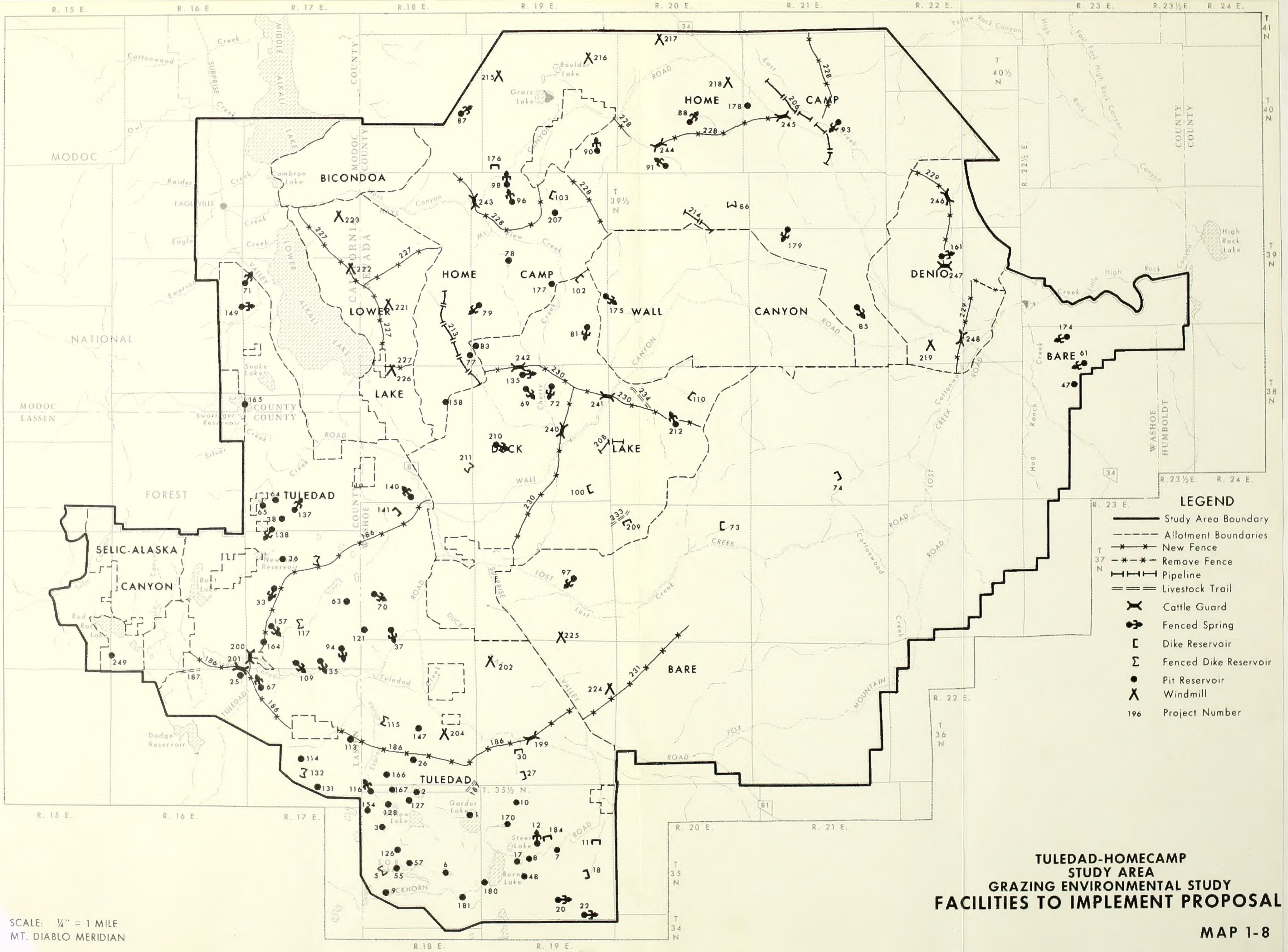


TULEDAD-HOMECAMP STUDY AREA GRAZING ENVIRONMENTAL STUDY

GRAZING EXCLUSIONS

SCALE: ¼" = 1 MILE
MT. DIABLO MERIDIAN

MAP 1-7



TULEDAD-HOMECAMP
STUDY AREA
GRAZING ENVIRONMENTAL STUDY
FACILITIES TO IMPLEMENT PROPOSAL

MAP 1-8

The fence surrounding the riparian area on Barber Creek would be constructed entirely with poles.

Gates would be placed on wild horse, livestock, and jeep trails.

Vegetation along fencelines or access roads would not be cleared prior to or during construction.

Where people need to frequently cross a fence, a stile or walk-through would be provided.

Cattleguards

Cattleguard construction would require excavating a hole approximately 8 feet wide, 12 feet long, and 2 feet deep. A precast concrete base would be set into the excavation. The earth would be backfilled and compacted around the outside of the base, leaving a hole in the middle.

A metal grid with openings large enough to deter animals from walking across, but close enough to allow vehicles to drive over, would be set onto the base. It would be held in place by a lip of the base or would be bolted to the base. Cattleguards in wild horse areas would have ¾-inch reinforcing bars welded between the rails to prevent horses from getting a hoof or leg caught.

A gate would be placed on one side of the cattleguard to allow movement of livestock through the fence. Cattleguards would be built with 15- to 20-ton load limits.

Water Developments

Water developments would be distributed to provide water at approximately 2-mile intervals to allow distribution of livestock and use by wildlife.

SPRINGS

A spring which discharges from one point would be developed using a backhoe to excavate a hole four feet square and three feet deep. A perforated pipe would be inserted vertically as a collection box. Where water seeps from a large area, perforated pipes would be buried horizontally throughout the seep to direct water to the collection box. Free-flowing water would be provided at ground level near the collection box for wildlife needs and to insure that the meadow does not dry up. Excess water would be piped to a trough. Overflow water would be piped back to the original drainage course. The spring and meadow complex would be fenced (FIGURE 1-5).

RESERVOIRS

Two basic types of reservoirs would be constructed: dike or retention dams and pit types. The dike type would be placed on drainages with 1-3 percent slopes. Construction would consist of moving fill material immediately above the dike or from a nearby source to create a dam structure. An adequate spillway would be provided for overflow. Six reservoirs of this type that contain high wildlife value would be fenced with water piped through the fence to a trough (MAP 1-8; FIGURE 1-6). To allow waterfowl use, design specifications would include irregularly shaped shorelines, peninsulas, and islands.

Pit-type reservoirs would be constructed on drainages with less than 1-percent slope or on dry lakebeds. Construction would consist of digging a pit to a predetermined size depending on the availability and need for water.

All disturbed areas would be reseeded to crested wheatgrass.

Any proposed reservoirs with suitable fisheries habitat would be fenced, would maintain a minimum pool, and would be managed to sustain a fisheries.

WATER TROUGHS

All troughs would include a ramp so small birds and mammals can escape from the trough. Troughs in areas devoid of a close, permanent source of water would include a solid bird ladder so large birds such as an eagle, sage hen, etc., can water.

WELL AND WINDMILL CONSTRUCTION

Well and windmill construction would consist of drilling a 6-inch diameter hole to an aquifer. A concrete pad would be poured on the surface to support a windmill and a livestock watering trough.

Wells providing water for wildlife would remain operable every year, including the "grazing rest" years.

PIPELINES

Pipelines would be installed with a "ripper tooth" attached to a tract-type tractor. The tractor would lower the four-inch-wide ripper tooth and simultaneously lay the plastic pipe as the tractor moves foward. The earth would settle back around the pipe so that a slight rise of four inches or less with a visible crack of varying widths (generally) less than two inches would be

FIGURE 1-5
Spring Development

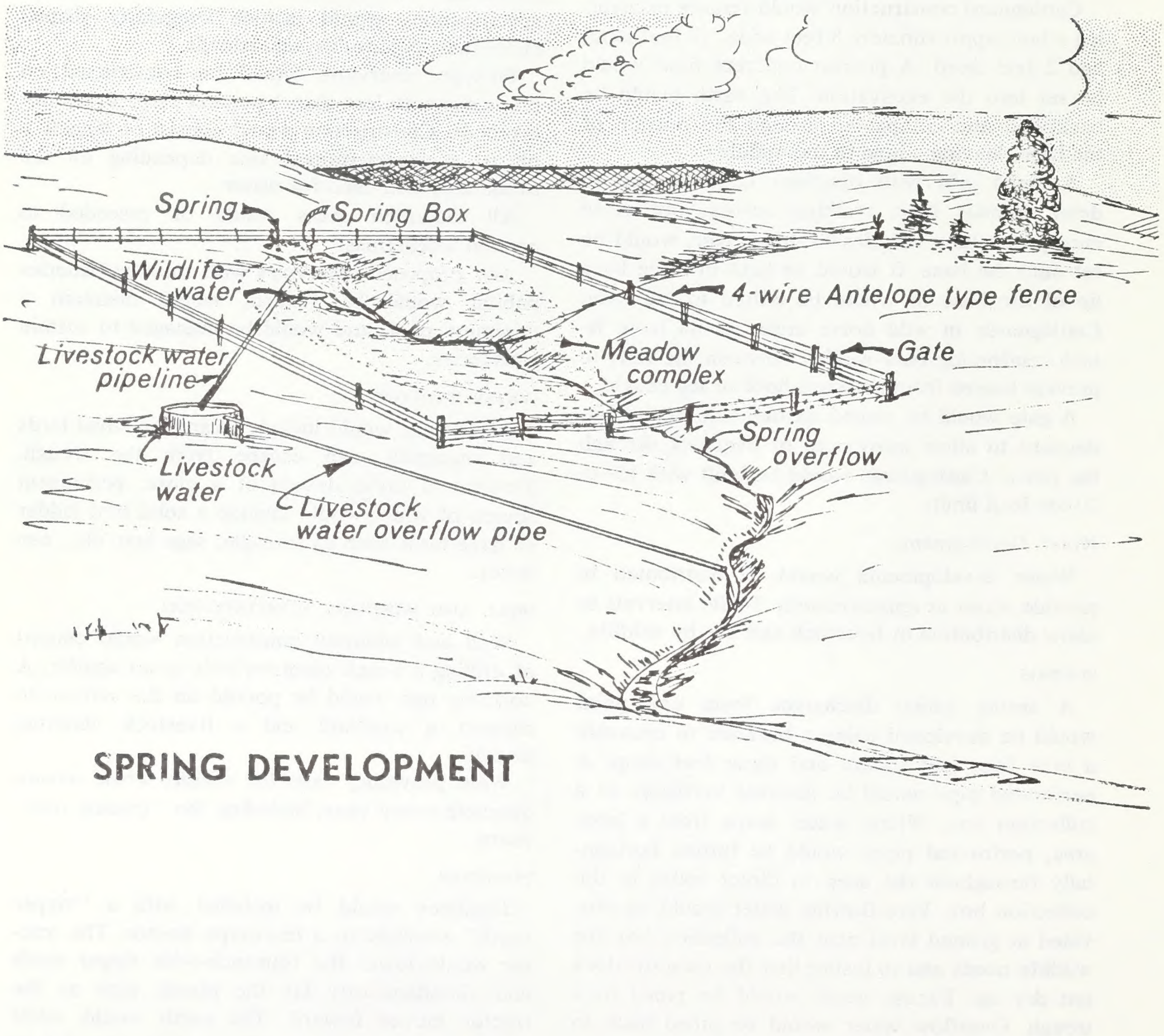
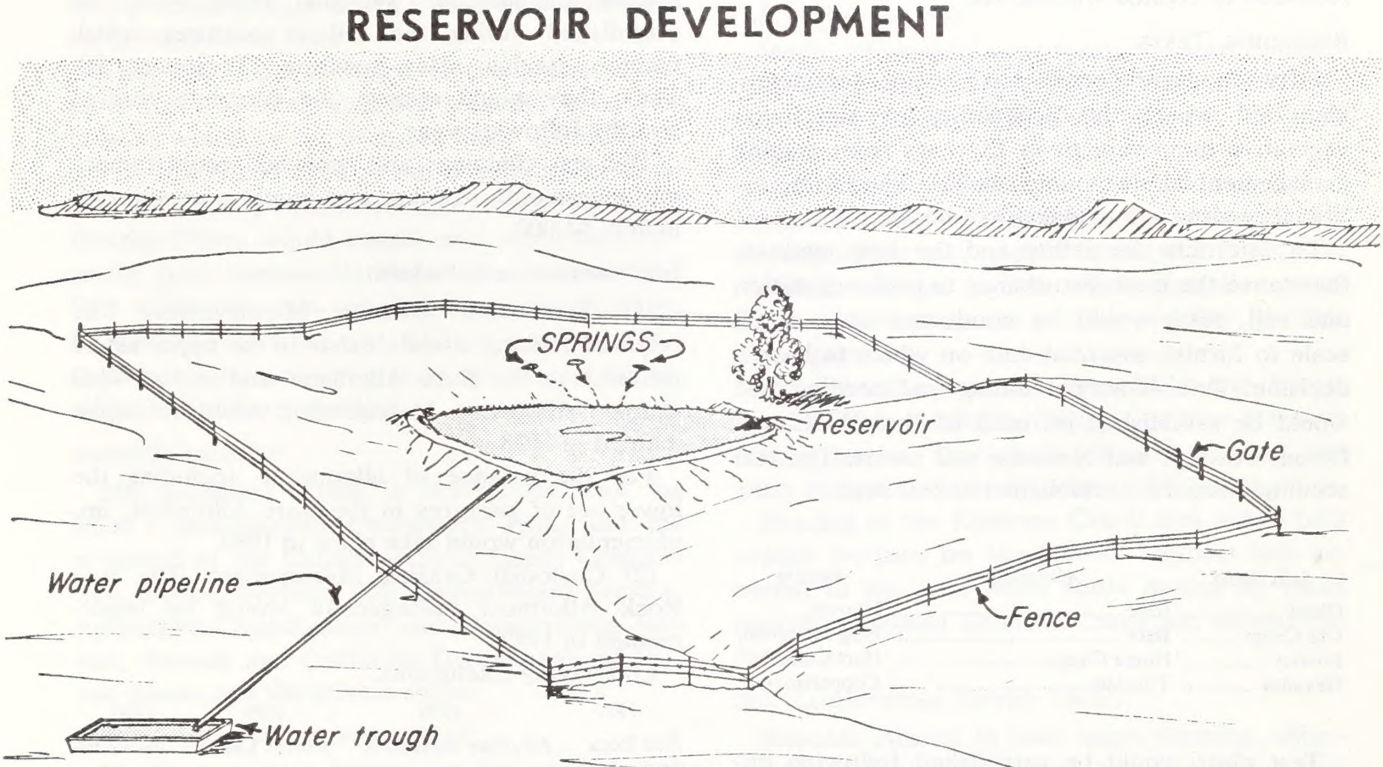


FIGURE 1-6
Reservoir Development



the only remaining disturbance except for the tractor tracks.

The pipe would be laid from 9 to 30 inches underground. In some instances, a backhoe or trencher would be used to prepare the trench for the pipeline.

Water troughs would be placed at approximately one-mile intervals.

For pipeline installations, no right-of-way clearing or road construction would be permitted.

Livestock Trails

To improve livestock distribution, four miles of three-foot-wide livestock trails would be constructed using a trail-building machine. Following construction, trails would be water-barred and reseeded to crested wheatgrass.

RESEEDING TESTS

Fifty thousand acres have been tentatively identified where the probability of significant vegetative improvement in 15 years from grazing management alone is improbable. Therefore, artificial seeding is a management possibility.

To determine feasibility and the best methods that cause the least disturbance to both vegetation and soil, tests would be conducted on a small scale to furnish essential data on which to base a decision. One 40-acre chaining and seeding test would be established on each of the Old Camp, Olson, Powley, and Nevador soil series. The test seedings would be established as follows:

Soils Series	*Allotment*	*Pasture*
Olson	Bare	Hoover.
Old Camp	Bare	Hog Mountain.
Powley	Home Camp	Hart Camp.
Nevador	Tuledad	Coppersmith.

Test plots would be established following on-the-ground inspection of suitable sites. Seedings would not be located within two miles of eagle or prairie falcon eyries, two miles of sage grouse strutting grounds, or 100 yards of any streams. An archaeological survey would be conducted prior to location to avoid archaeological sites. Seedings would not be located within sight of Nevada State Highways 81 and 34.

Chaining, using anchor chain pulled by two track-type tractors, would remove 70-80 percent of the sagebrush. Two chainings in opposite directions are generally required.

Following chaining, the area would be seeded with a deep furrow drill to a depth of three to four inches. Alfalfa, four-wing saltbrush, Kocia, crested wheatgrass, and sanfoin would be seeded at a rate of about 10 pounds per acre on all sites. Russian wildrye would also be seeded on the Old Camp test plot.

Seeding techniques and selection of plant species were selected using Agricultural Research Service (ARS) test results and using guidelines found in ''Restoring Big Game Range in Utah'' (Plummer, 1968).

Test plots would not be fenced in order to provide analysis of seedling establishment within the grazing management systems. Plots would be established during the fall in pastures which receive grazing after seedripe (Treatment B). Thus, they would receive one complete year of rest the following year.

The test chainings and seedings would require one man-month of labor and would cost approximately $4,000.

Implementation Schedule

(1) Systematic Grazing Management. The required fencing already exists in the upper set of pastures in the Bare Allotment and in the Wall Canyon Allotment. Management would be implemented in 1978.

For the balance of allotments, including the lower set of pastures in the Bare Allotment, implementation would take place in 1980.

(2) Custodial Grazing Management. The Red Rock Allotment management would be implemented in 1980.

(3) Grazing Exclusions.

1977	*1978*	*1979*	*1980*
Red Rock Snake Lake Bare Creek	All other exclusions	Lower Lake	Bicondoa

(4) Facilities to Implement Proposal. Water developments would be implemented in 1978. Fencing, cattleguards, and livestock trails would be implemented in 1979.

(5) Reseeding Tests.

Allotment	*Pasture*	*Year*
Bare	Hog Mountain	1978
Bare	Hoover	1979
Home Camp	Hart Camp	1979
Tuledad	Coppersmith	1979

(6) Monitoring Systems.

Vegetation—Ongoing
Water Quality—Ongoing
Wildlife—Ongoing
Wild Horses—1977
Fisheries—Ongoing
Livestock Production—1977

Manpower Required

Existing BLM personnel would implement the proposed action for survey, design, construction, and maintenance of range improvements and for AMP supervision. All survey and design work has been completed for range improvements proposed. Contracts would be utilized for much of the project development with the exception of spring developments which would be done by existing engineering crews.

After full implementation of the proposed action, it is estimated that two seasonal BLM employees would be required for three months each (or six MM/year) to carry out condition and trend studies. Other permanent employees in the BLM District Office would handle any other work accruing from implementation of the proposal. The SCS might hire two full-time specialists (totaling 22 MM/year) to work with BLM in monitoring the impacts of rest-rotation grazing systems on the region's soil-water properties.

Interrelationships

The proposed action is interrelated with the BLM's Management Framework Plan, and the programs of the California State Lands Commission, Forest Service, Soil Conservation Service, Agricultural Stabilization and Conservation Service, Nevada and California Departments of Fish and Game, and the private sector.

MANAGEMENT FRAMEWORK PLAN

The Management Framework Plan (MFP) provides the multiple-use framework for establishing coordinated land-use allocations for all resources and for establishing objectives for and constraints on all planning that follows.

The livestock grazing management plans which are the subject of this environmental statement must achieve the objectives of, and adhere to the constraints provided in, the MFP.

Management Framework Plan recommendations and decisions pertinent to livestock grazing management are crucial for analysis of the proposed action and its interrelationships with other agency activities and private interests. These are presented in TABLE 1-12, 1-13.

The proposed action would be carried out within the constraints of the Tuledad/Home Camp MFP. The eight Allotment Management Plans (AMPs) in the proposed action are specialized activity plans which state the conditions under which, and the manner in which, livestock grazing use would be conducted within the

AGENCY AND PRIVATE INTERRELATIONSHIPS

California State Lands Commission

One hundred and sixty acres of land administered by the State of California would be subjected to periodic rest/graze treatments rather than the present continuous grazing pattern.

U.S. Forest Service

Modoc National Forest forms the west boundary of Tuledad Allotment. Four operators graze on both the Tuledad Allotment and the National Forest.

Under the proposed action, two cattle operators would no longer be able to use their forest permit in conjunction with their Tuledad Allotment use. Resultant changes in their yearly operation could affect historical access or the usability of their forest permits.

Two sheep operators using BLM and Forest Service lands would be required to alter previous trailing routes. This could affect movement and entry and exit points of sheep on the forest.

Fencing of the Emerson Creek area would help reduce trespass on the forest. Trespass has occurred in the area when cattle owned by BLM operators crossed Emerson Creek and entered the forest.

Soil Conservation Service (SCS)

Rancher interest in total ranch planning, stimulated by the proposed action, has placed increased demands on the local SCS. This has resulted in the addition of one employee with plans for hiring a second.

The proposed action has also generated local interest in a "Coordinated Plan" in which all agencies and individuals coordinate resource planning on a regional basis. The SCS along with BLM, Forest Service, other Federal agencies, and State and local agencies are pursuing the "Coordinated Plan" concept. This has increased SCS regional and State office activity with reference to the Tuledad/Home Camp Study Area. Two new em-

TABLE 1-12
LIVESTOCK GRAZING PROPOSALS

MFP Step 2 Proposals	MFP Step 3 Decisions	Rationale
1. Initiate systematic livestock management plans on the following allotments: a) Bare b) Tuledad Common c) Duck Lake d) Denio e) Home Camp f) Wall Canyon g) Lower Lake h) Selic-Alaska Canyon Stocking rates should not exceed present levels.	Accept recommendation with the provision that grazing will not be allowed on two isolated tracts at the extreme north end of Tuledad Allotment as follows: 1) At mouth of Eagle Creek Creek - 200 Acres 2) Adjacent to Dusenberry Peak - 280 Acres	Range conditions are generally far below potential. Restoration of range conditions will result in better resource production, economic well being of the community and maximum supplementary benefits. Implement systems at or near current stocking rate or lower if permittee desires since grazing capacities have not been established under systematic grazing. The monitoring system will determine if the initial grazing formula is satisfying plant requirements and range condition is improving. Reason for excluding is tracts are isolated and need to be reserved for deer winter range use.
2. The following allotments will be managed at a custodial level: a) Corral b) Highway c) Cold Springs Mtn. d) Cedar e) Boot Lake f) State Line g) Clarks Valley h) Red Rock	Accept recommendation with provision that grazing will not be allowed on 160 acres on the shore or Red Rock Lake. This will be fenced to improve vegetation and reserve all vegetation for waterfowl.	Seven parcels of federal lands are fenced within larger parcels of private land. Systematic management of these parcels is impractical and uneconomical. These parcels are therefore designated as custodial management areas and will be licensed as separate custodial allotments. The reason for excluding 160 acres on Red Rock Allotment is that custodial grazing management prescribed will not improve waterfowl habitat.

TABLE 1-12
LIVESTOCK GRAZING PROPOSALS

MFP Step 2 Proposals	MFP Step 3 Decisions	Rationale
3. Terminate livestock grazing on the Bicondoa Allotment. Reintroduce and manage range for bighorn sheep (MFP Wildlife 10.2)	Accept recommendation.	The Bicondoa does not allow systematic management due to a lack of water and adverse topography. The area has been identified (URA) as a bighorn sheep reintroduction area. Nevada Fish and Game currently places a #2 statewide priority for bighorn sheep transplant. Such transplants should be in an area of no competition for livestock and little human disturbance.
4. Terminate livestock grazing in Alaska Canyon and Selic Canyon Allotments if management systems are unable to substantially improve range conditions. No more than six years will be allowed to seek proper management results before termination of livestock grazing occurs.	Accept recommendation.	Extremely valuable aspen, riparian and mountain brush fields exist in in these allotments. The two allotments, either separately or combined, are not appropriate for systematic grazing management because of the limited area they encompass and because of the pattern of intermingled ownership. The economic impact of livestock grazing termination will be severe. An estimated 75 percent reduction in income of one individual will result. It is because of this economic impact that other alternative management plans must be considered. Providing up to six years of management prior to termination of grazing privileges will allow time for analysis of grazing systems and for involved individuals to adjust their operations land ownerhsip status.

TABLE 1-12 (Continued)

MFP Step 2 Proposals	MFP Step 3 Decisions	Rationale
5. Defer management decisions on Little High Rock until MFP preparation for Massacre Planning Unit.	Accept recommendation.	The boundary of Little High Rock bisects that of High Rock Canyon which is within the Massacre Unit. Since both are being considered for similar resource values and are homogenous from a geographical location, they should be managed as a single unit.
6. Implement monitoring system capable of providing reliable data to assess achievement of management objectives.	Accept recommendation	Adequate monitoring is essential if progress in reaching management goals is to be determined and if management revisions are to be recommended.
7. Stocking rates on implemented AMPs will be adjusted, if needed, after one complete grazing cycle.	Accept recommendation.	One cycle is adequate time to assess the need for adjustments.
8. Culturally treat the identified areas in a manner consistent with other resource values. No treatment should be allowed within 2 miles of any strutting ground, eagle or prairie falcon eyrie. Treatments should provide for plant diversity not monotypes.	Consider the large-scale cultural treatments after further small-scale piloting to assess success of techniques identified.	Some range sites are depleted to such an extent that even systematic management is not expected to adequately improve range condition in a reasonable time. Seedings will be conducted on a small scale on portions of these areas where past experimentation shows a high chance of success. Such treatments must consider all other resources and therefore will not be monotypic.

TABLE 1-12 (Continued)

MFP Step 2 Proposals	MFP Step 3 Decisions	Rationale
9. Forage increases should be first allocated to meet wildlife habitat objectives or other multiple-use objectives. Subsequent forage increases should be allocated to meet all Class I demands.	Accept recommendation.	Livestock management practices have frequently been the cause of deteriorated wildlife habitat or has negatively impacted other resources. If vegetation increases or improvements occur, they should be used to rectify previous problems.
10. Tuledad Herd Management Area - Maintain a population of 80-100 horses.	Protect and Maintain no less than 100 head.	PL-92-195 allows for horses to be managed for numbers which existed at passage of act. This level is in compliance with the law and public sentiment.
11. Fox-Hog Mountain Herd Management Area - Maintain a population of 50 horses.	Accept recommendation.	Horse population of 50 will allow for 7 to 9 individual bands and remain compatable with vegetative production and cover.

TABLE 1-13
OTHER LAND AND FORAGE USE PROPOSALS

MFP Step 1 Proposals	MFP Step 3 Decisions	Rationale
Wildlife		
1. If rare or endangered species are identified within Tuledad/Home Camp, take appropriate steps to ensure adequate protection.	Accept recommendation.	Action complies with law and policy.
2. Provide habitat capable of adequate quality and quantity to support the following deer populations. Deer Populations Hays Canyon Peak 270 North Buffalo Hills 370 Boulder Mountain 270 Cherry Mountain 270 Fox Mountain 150 Mahogany Mountain 105 Hog Ranch Mountain 40 Wire Grass Lake 95 Warner/Cottonwood Mountain 3,000 TOTAL 4,570	Accept recommendation. Where range management proves incapable of providing acceptable habitat, exclusion of livestock must occur.	Implementation of grazing management systems will provide for reproduction, density and improved forage for all classes of animals. As range condition improves, forage will be sufficient to meet the needs of increased wildlife numbers. Where grazing systems are unable to meet wildlife needs, other actions such as cultural treatments, livestock exclusion and other methods may be required.

TABLE 1-13 (Continued)

MFP Step 1 Proposals	MFP Step 3 Decisions	Rationale
Wildlife (Continued)		
3. Allow maximum recovery of vigor and reproduction of bitterbrush on deer winter ranges to provide habitat capable of supporting the following deer populations by 1985. Range — Deer Populations Wire Grass Lake Area — 75 North Buffalo Hills — 110	Develop grazing management plan that will accomplish objectives for leader growth and reproduction of bitterbrush. Results will be modified accordingly.	Management plans must be responsive to special requirements.
4. Fall holding areas or transition in the Cottonwood Mountains and near Snake Lake should be managed to provide improved habitat for about 1,000 deer for two months during late fall and early winter.	Deer habitat on Cottonwood Mountain and near Snake Lake will be managed to provide habitat in satisfactory condition with a stable or upward trend as determined by an acceptable standard of habitat analyzes.	Approximately 1,000 deer currently use these areas as holding areas prior to moving to winter range. By providing this stable or upward trend condition these ranges may allow increased winter survival rates and production of healthier offspring.
5. Manipulate vegetation on existing antelope winter range at the upper end of the Bare Allotment and the rolling hills around Duck Flat. Brush height should be maintained below 20 inches and all brush areas should be interspersed with frequent open areas that contain grass and forbs.	Accept recommendation to the point that areas of tall sage will be manipulated where site analysis shows succeeding forage will be superior to brush removed.	Coversions can be more detrimental than the existing condition. Carefully planned actions are required.

TABLE 1-13 (Continued)

MFP Step 1 Proposals	MFP Step 3 Decisions	Rationale
Wildlife (Continued)		
6. Waterfowl nesting habitat should be created in existing water bodies by developing artificial structures. Shoreline vegetation and nearby rangeland should be allowed to reach optimal densities for waterfowl nesting. Elimination of grazing or deferred grazing during nesting season should be implemented to achieve desired densities.	Accept recommendation.	Proper nesting habitat improves production.
Red Rock Lake, Boot Lake, Snake Lake, Lower Lake, and Newland Reservoir have high waterfowl habitat improvement potential and should receive priority for improvement. S.O.B. Lake, Willow Lake, and Border Lake have moderate potential and should receive second management priority.		
7. Eliminate livestock use on riparian areas to allow for maximum vegetation along streams.	Grazing systems must be designed to improve riparian vegetation on streams throughout the units. Fence streams where management is unable to improve riparian habitat.	Fencing is expensive and in many cases a grazing system will give desired results with little or no fencing. Where the system will not provide proper protection, fencing is required.

TABLE 1-13 (Continued)

MFP Step 1 Proposals	MFP Step 3 Decisions	Rationale
Wildlife (Continued)		
8. Ensure that grazing systems and other land-use practices do not alter more than 75 percent of each vegetation type thereby maintaining a minimum of 25 percent of native vegetation types to avoid elimination of bird species.	Accept recommendation.	Retention of 25 percent of each habitat type will prevent total elimination of species by providing an acceptable amount of each habitat type.
9. Monotypic vegetative developments for livestock should not be allowed within 3 miles of a sage grouse strutting ground.	Prohibit all vegetation manipulation within 2 miles of sage grouse strutting areas and within 100 yards on any meadow or stream.	Protection of a 2-mile wide area around strutting grounds has been shown as adequate to protect a majority of nest sites. Meadows and streams are crucial habitat and must be protected.
10. Allow no grazing within 3 miles of a strutting ground during the strutting and nesting season. Restrict human activity on all strutting grounds during March and April.	Rejected.	This recommendation would provide for maximum protection and production. However, the recommendation is impractical for implementation.
11. All sage grouse habitat should be managed to produce a diversified habitat. Keep plant succession near climax state. Livestock should not be allowed to remove more than 20 percent of all forbs.	Rejected.	It is impossible to set a specific level of forb removal. Plant diversification and succession will result from planned grazing management and natural processes.

TABLE 1-13 (Continued)

MFP Step 1 Proposals	MFP Step 3 Decisions	Rationale
Wildlife (Continued)		
12. Fence to exclude all livestock grazing, rehabilitate watertable, and manage all meadow habitat.	Decide upon treatment of meadows on a site-by-site basis and fence where necessary.	Unsystematic livestock management has lead to deterioration of meadows which need improvement. However, each meadow requires separate methods of treatment depending on the nature of their condition.
13. Exclude livestock from Hays Canyon and High Rock-Little High Rock areas.	Cancel sheep permit of the Bicondoa Allotment. Do not convert to cattle use.	Area is most suitable for bighorn sheep habitat.
Lands		
1. Public lands in the Duck Flat area (as shown in the overlay of MFP Step 1 Lands) should be identified as valuable for agricultural purposes. When changes in the economic climate and irrigation water is realized, they should be transferred to private ownership for agricultural development.	Consider exchanging scattered parcels near deeded lands to allow agricultural development.	Water, existing and proposed, is not sufficient for total development. Modified for this reason.

TABLE 1-13 (Continued)

MFP Step 1 Proposals	MFP Step 3 Decisions	Rationale
Soil and Watershed		
1. Reduce the soil erosion class to slight throughout each planning unit within 30 years.	Implement livestock management plans that restore vegetation to site potential.	By achieving maximum vegetation cover and productivity, the objective will be met.
2. Construction of detention dams to control large waterflows to prevent loss of soil and water.	Improve upper watershed and meadow healing through proper management prior to expending large sums of money for structures.	Good resource management will achieve most of the stated objectives without large capital investments.

ployees have just been added to the SCS staff in Susanville to enhance the program.

Agriculture Stabilization and Conservation Service (ASCS)

The ASCS is able to provide cost-sharing funds to ranchers for the development of springs, wells, pipelines, and other waters on private land. Private landowners in the study area have shown interest in programs. However, funds are limited to $2,500 per individual and stringent project specifications can limit rancher enthusiasm in cost sharing. The possibility of "special project" funding is being explored by ASCS to accommodate more cost sharing. This could require a realignment of ASCS priorities; it could require the preparation of a special funding request. It would also require closer BLM/ASCS coordination. The Nevada ASCS conducted a tour of the Tuledad/Home Camp area last summer to assess the needs.

Nevada and California Departments of Fish and Game

The Departments of Fish and Game are developing species management plans for game and nongame wildlife. These plans have not been completed but objectives for some species and recurring habitat problems have been identified. The achievement of planned objectives and the resolution of recurring habitat problems depend to a large degree on grazing management on public lands.

Where habitat influences the expansion or maintenance of wildlife populations, the Departments of Fish and Game are greatly affected by management on public lands. If this management adversely affects game populations, fewer hunting opportunities are available and license sales decrease or, where management favors game, population increases may occur with resultant increases in hunting opportunities and license sales. Thus, the Departments' economic bases are tied closely to management of public lands. Changes in land management could therefore affect manpower and program capabilities in these Departments.

Private Sector

The proposed action would result in an increased demand for financing and manpower to develop private waters; an increase in manpower requirements for livestock supervision for some operations and a decrease for others; and maintenance of additional fences, springs, windmills, pipelines, and other range facilities. The proposed action would in time stabilize the production of forage and tenure of grazing privileges.

There are 51,480 acres of private land in the proposed Systematic Grazing Management Area that are intermingled with and grazed at the same time as the public lands. Most of these lands contain springs or are meadowlands and constitute the most productive rangeland.

While the 51,480 affected private acres are only 7.5 percent of the total 677,406 acres in the Systematic Grazing Management Area, they nevertheless constitute a substantial real property.

By law, the private sector itself must fence its lands separately from the public lands if it does not desire to have the grazing use of the private lands regulated in the same manner as the public lands. Such fencing on the highly scattered and irregular tracts would be impractical. All such private lands that lend themselves to fencing have already been fenced (MAP 1-3).

Chapter 2

DESCRIPTION OF THE EXISTING ENVIRONMENT

Chapter 2

DESCRIPTION OF THE EXISTING ENVIRONMENT

VEGETATION

Introduction

The majority of the study area is dominated by sagebrush species. White fir forests occur on cool sites at high elevations. Juniper and curlleaf mountain mahogany woodlands form a transition between the sagebrush and the white fir. Shadscale and greasewood dominate the lowest elevations, often rimming the enclosed basins characteristic of the Great Basin Desert.

Daubenmire (1970) has suggested that "shrub-steppe" is an appropriate term to classify the vegetation for it denotes the existence of an appreciable amount of perennial grasses on zonal soils.

Existing and potential forage productivity data will be shown on tables in Chapter 3.

Habitat Types of the Tuledad/Home Camp Study Area

The following classification and discussion of habitat types of the study area is based primarily on information contained in the Soil Conservation Service (SCS) soil survey for this area (Summerfield and Bagley, 1974), SCS range-site descriptions (U.S. Dept. Ag., SCS, 1965), and BLM-conducted field studies (APPENDIX F). The SCS uses the term "range site." It is conceptually synonomous with habitat type. Range site refers only to rangelands, land on which the native vegetation is predominantly herbs or shrubs suitable for grazing. Habitat type is more encompassing by describing associations that do not meet SCS criteria for rangeland (white fir and mountain mahogany dominated communities, for example) and thus have not been identified as range sites. Unless otherwise noted, information on soils and vegetative climaxes comes from the soil survey and range site descriptions, and information on present vegetation condition and trend comes from the field studies.

Range condition is similar in all allotments (APPENDIX F). Therefore, no distinctions have been made between allotments in the discussion of habitat types that follows. A discussion of range conditions and trends follows the vegetation classification and description.

The vegetation of the Tuledad/Home Camp Study Area can be classified into two vegetation zones: the big sage/bluebunch wheatgrass zone (the shrub-steppe) and the white fir zone. The big sage/bluebunch wheatgrass zone is subdivided into nine association groups comprising 27 habitat types (TABLE 2-1). The white fir zone consists of only the white fir habitat type.

A detailed description of climax plant communities and present vegetative composition is presented for each habitat type (TABLE 2-2). A brief description of present vegetative composition is included in the following habitat type write-ups.

The locations of all habitat types and association groups are shown on MAP 2-1 (enclosed in the back cover packet). The acreage of each habitat type by allotment and grazing exclusion area is shown in APPENDIX F.

Habitat type characteristics (i.e., percent of study area, elevation, annual precipitation, and total annual herbage production) are shown on TABLE 2-3.

THE BIG SAGE/BLUEBUNCH WHEATGRASS ZONE

Available soil moisture is the overriding limiting factor in shrub-steppe vegetation. Effects of topography, soil depth, texture, structure, and solute concentration therefore have pronounced influences on vegetation composition and production. Since most of the annual precipitation occurs during winter and early spring, the most active period of growth is spring. Typical climax community dominants include shrubs such as big sagebrush, low sagebrush, silver sagebrush, shadscale, greasewood, and antelope bitterbrush. Large perennial grasses include Idaho fescue, bluebunch wheatgrass, Great Basin wildrye, Thurber needlegrass, and Sandberg bluegrass. Juniper, curlleaf mountain mahogany, aspen, and willows are the most common trees.

Undisturbed climax stands are rare in the study area. The major disturbance factors responsible for the retrogression of most communities have been livestock grazing and the control of natural fires. The effects of these factors in shrub-steppe vegetation are, respectively, reduction of the major perennial grasses and increased abundance of shrubs (Daubenmire, 1970). Of the two, livestock grazing has played the dominant role.

The big sage/bluebunch wheatgrass association is the climatic climax of the big sage/bluebunch

TABLE 2-1

VEGETATION ZONES, ASSOCIATION GROUPS, AND HABITAT TYPES IN THE TULEDAD/HOME CAMP STUDY AREA*

dry

Available soil moisture gradient

Moist

Zones	Association Groups	Habitat Types	Habitat Type Number	Range Site Number (Summerfiled & Bagley, 1974)
big sage/bluebunch wheatgrass	shadscale	shadscale/Indian ricegrass	HT- 4	NV23- 4
		shadscale-big sage	HT-12	NV23-12
	greaswood	greasewood/Great Basin wildrye	HT- 2	NV23- 2
		greaswood/saltgrass	HT-10	NV23-10
	low sagebrush	low sage/Sandberg bluegrass	HT- 8	NV23- 8
		low sage/bluegrass-squirreltail	HT-21	NV23-21
		low sage/Idaho fescue-Sandberg bluegrass	HT-14	NV23-14
		low sage-rabbitbrush	HT- 1	NV23- 1
		low sage/Idaho fescue	HT-17	NV23-17
	big sagebrush	big sage/Indian ricegrass	HT-11	NV23-11
		big sage/squirreltail-Indian ricegrass	HT- 6	NV23- 6
		big sage/Great Basin wildrye	HT- 5	NV23- 5
		big sage/bluebunch wheatgrass	HT-20	NV23-20
		big sage/bluebunch wheatgrass-Great Basin wildrye	HT-18	NV23-18
		big sage/bluebunch wheatgrass-Thurber needlegrass	HT-16	NV23-16
		bitterbrush-big sage/bluebunch wheatgrass	hT-15	NV23-15
		juniper/big sage/bluebunch wheatgrass	HT-24	NV23-24
		bitterbrush-big sage/bluebunch wheatgrass-Idaho fescue	HT-22	NV23-22
		big sage/Idaho fescue	HT- 7	NV23- 7
		big sage-snowberry/Idaho fescue	HT-19	NV23-19
		big sage-silver sage/Great Basin wildrye	HT- 9	NV23- 9
	curlleaf mountain mahogany	curlleaf mountain mahogany/big sage/Idaho fescue	HT-25	NV23-25
	silver sage	silver sage/Nevada bluegrass	HT- 3	NV23- 3
	baltic rush	baltic rush	HT-23	NV23-23
	aspen	aspen	HT-26	NV23-26
	Nevada bluegrass	willow/Nevada bluegrass	HT-27	NV23-27
		Nevada bluegrass-sedge	HT-13	NV23-13
white fir	white fir	white fir	HT-28	NV23-28

* Arranged along a soil moisture gradient, first by zones, then by association groups, then by habitat types.

NOTE: The vegetation classification and soil moisture relationships are based on information from Summerfield and Bagley (1974), USDA, SCS (1965), Daubenmire (1940, 1942, 1952), Fautin (1946), Franklin and Dyrness (1973), and Dealy (1975).

	BIG SAGE / BLUEBUNCH WHEATGRASS ZONE																											WHITE FIR ZONE
	Shadscale Assns.		Greasewood Assns.		Low Sagebrush Associations					Big Sagebrush Associations														Baltic Rush As.	Aspen Assoc.	Poa / Sedge Associations		Wht. Fir Assoc.
	HT-4	HT-12	HT-2	HT-10	HT-8	HT-21	HT-14	HT-1	HT-17	HT-11	HT-6	HT-5	HT-20	HT-18	HT-16	HT-15	HT-24	HT-22	HT-7	HT-19	HT-9	HT-25	HT-3	HT-23	HT-26	HT-27	HT-13	HT-28
TREES																												
Sierra juniper						/0-1	T/0	4/0						T/T		24/0-5	8/30-40	*/0-2	0/0-2	0/0-1						5/0	3/0	
White fir																												
Lodgepole pine																												
Jeffrey pine																												
White pine																												
Ponderosa pine																										T/0		
Aspen																										11/0		
Water birch																										1/0		
Chokecherry																	T/0			T/0								
Mountain mahogany																												
SHRUBS																												
Big sagebrush	8/0-2	45/10-20	26/0-5	0/3-5			T/0	8/0	2/0	34/5-15	70/30-40	77/20-30	64/15-20	59/10-15	35/10-20	24/5-10	23/5-15	*/5-10	50/10-20	49/5-10	15/10-20	21/*			3/*	13/0	20/0	
Low sagebrush		7/0			*/35-45	36/20-35	56/20-30	50/0-10	43/15-25				1/0			5/0	16/0				T/0		T/0					
Silver sagebrush																					33/0-1		72/20-40	8/*			4/0	
Bud sagebrush	33/0-5	22/5-10	7/0-5								0/0-2																	
Black sagebrush																												
Shadscale	18/50-70	8/20-30	10/0-10	6/0																								
4-wing saltbush			0/0-2	0/0-2						2/5-10																		
Rabbitbrush	2/0-2	0/0-2	/1-5	0/3-10	*/0-2	4/1-2	4/0-5	4/30-50	0/1-3	10/0-5	2/0-3	7/1-10	5/2-5	2/1-2	9/2-5	T/0-5	5/0-3	*/1-2	1/1-3	3/1-3	17/0-3	1/*				3/0	5/0	
Spiny hopsage	6/0-10	6/10-20	T/0-2							13/5-10	2/1-10	1/0-2	T/0				0/0-2											
Serviceberry																0/0-5	0/0-3	*/0-2	T/0-5	0/1-5						T/0		2/*
Western chokecherry																												
Gooseberry Ribes spp.														0/T	0/0-3	T/0-3	1/0		T/0-2	7/0		11/*			18/*	T/0		
Currant																											0-1/0	
Willow																										10/0-1	0/0-1	
Black greasewood	24/0-5	10/5-20	38/10-40	49/5-10						13/0-10		1/0-5																
Snowberry																	1/0-2		0/0-3	9/5-10		2/*			2/*			11/*
Snowbush																											0-2/0	
Horsebrush	9/0-2	2/0-2	5/0			2/0				22/0-5	5/0-5	1/0	2/0-1	0/0-2	0/0-2		2/0		1/0-2									
Woods rose																T/0										T/0-2	0/0-2	
Sea blite				42/0-7																								
Purple sage																												
Winter fat													T/0															
Squaw apple								T/0						0/T		0/0-2												
Iodine bush			0/0-2	0/0-2																								
Bitterbrush								0/0-T	0/2-10					0/1-3	0/0-5	13/10-25	0/0-5	*/10-20	2/2-20	0/1-5								
Curlleaf ledifolius																												
Others						0/0-2			0/0-2	0/0-2							0/0-2		0/0-2	0/0-5								
GRASSES																												
Bluebunch wheatgrass					*/0-5	0/1-5	0/0-5	0/0-5	0/5-30	1/0			1/20-50	0/40-60	8/35-45	2/20-35	5/10-20	*/30-40	1/5-25	1/0-15		2/*						
Slender wheatgrass																										T/3-5	T/3-5	
Western wheatgrass			T/0							0/0-15	0/0-5	0/0-2	0/0-2				0/1-5				0/0-3		4/0			0/0-15	0/0-15	
Desert wheatgrass																T/0												
Red top																										0/5-15	T/5-15	
Shortawn foxtail																											T/0	
Rattlesnake chess								T/0																				

PRESENT COMPOSITION (%) / POTENTIAL COMPOSITION (%)

ASTERISK (*) SIGNIFIES THAT PERCENT SPECIES COMPOSITION IS NOT KNOWN.

T = trace < 1%

Present composition is by canopy coverage; potential composition is by weight (production).

Potential composition based on USDA, SCS (1965).

TULEDAD-HOMECAMP
STUDY AREA
GRAZING ENVIRONMENTAL STUDY

Table 2-2

VEGETATIVE SPECIES COMPOSITION
OF HABITAT TYPES

	BIG SAGE / BLUEBUNCH WHEATGRASS ZONE																											WHITE FIR ZONE
	Shadscale Assns.		Greasewood Assns.		Low Sagebrush Associations					Big Sagebrush Associations														Baltic Rush As.	Aspen Assoc.	Poa / Sedge Associations		Wht. Fir Assoc.
	HT-4	HT-12	HT-2	HT-10	HT-8	HT-21	HT-14	HT-1	HT-17	HT-11	HT-6	HT-5	HT-20	HT-18	HT-16	HT-15	HT-24	HT-22	HT-7	HT-19	HT-9	HT-25	HT-3	HT-23	HT-26	HT-27	HT-13	HT-28
GRASSES (continued)																												
Mountain brome								0/T											2/0	3/0		2/*			11/*			4/*
Japanese chess																									1/*			
Bromus squarrosus									5/0																			
Cheatgrass			7/0				2/0	3/0	5/0	2/0	16/0	T/0	2/0	18/0	7/0	9/0	11/0		1/0						T/*	3/0	1/0	
Desert saltgrass																												
Great Basin wildrye			0/5-20	0/10-20				0/0-5		0/0-T	0/0-15	1/25-40	0/5-10	0/10-20	0/2-15	0/0-2	1/5-10	*/1-3	0/5-15	0/2-5	3/50-70	2/*	0/0-3			0/0-5	0/0-5	
Blue wildrye																						1/*			22/*	1/0		2/*
Creeping wildrye				0/2-5																	0/0-2		0/5-15			0/2-5	0/2-5	
Idaho fescue					*/0-10	2/0-2	3/5-40		3/10-25				5/0	12/0	17/0	7/5-15	3/0-3	*/5-15	5/15-35	3/40-60		15/*	1/0					
Marsh grass																												
Meadow barley																											T/0	
Onion grass																0/0-2			1/0			6/*			7/*	T/0		13/*
Mat muhly												T/0									11/0		14/1-10	T/*		T/0-3	2/0-3	
Indian ricegrass	0/5-10	0/5-10			*/0-5		0/0-2			3/30-40	T/10-15	1/0	0/0-2		T/0		0/1-5									1/0		
Webber's ricegrass	0/1-5				*/0-5	0/1-5	0/0-2				0/5-10		0/0-2		0/1-3											0/0		
Timothy																										0/1-5	0/1-5	
Rabbitsfoot grass																										0/0-3	0/0-3	
Sqirrel tail	0/5-10	1/5-10	T/2-10		*/5-10	3/5-10	4/1-5	1/5-10	3/1-5	1/1-15	4/10-15	5/5-10	7/2-5	6/3-5	14/5-10	5/1-5	2/1-5	*/1-3	2/1-5	13/0-2	0/0-1	23/*	2/5-25		1/*	T/0	T/0	6/*
Alkali sacaton			0/0-10	0/10-30																								
Columbian needlegrass																												23/*
Needle & thread grass										0/5-15					0/2-3	0/	0/1-5											
Thurber's needlegrass					*/0-5	0/1-5	0/0-5	0/0-5	0/2-10		0/5-10		0/5-15	0/5-10	0/5-10	T/3-5	0/1-5	*/2-5	T/3-10	4/0-5		3/*						
Junegrass																0/0-2		*/0-2	0/0-1									
Nuttall alkali grass				0/0-5																							T/0	
Blue joint																										8/0		
Poa spp.	0/0-2	0/0-10	0/0-5	0/5-10	*/10-25	44/25-45	27/17-30	16/1-18	11/10-20		0/0-10	T/5-10	13/4-10	8/4-10	6/4-10	7/4-10	18/4-15	*/4-10	9/4-10	1/4-10	7/0-3	7/*	0/15-35		5/*	14/23-40	6/23-40	9/*
Saltgrass			0/0-15	0/20-30						0/0-2																		
GRASSLIKES																												
Carex spp.				0/1-5							0/0-1	T/0-10	0/0-2			T/0		*/0-2	0/0-2		10/0-5	T/*	0/2-15		4/*	5/20-30	20/20-30	
Baltic rush												1/0							0/0-2		1/0		0/5-15	43/*		3/5-10	20/5-10	
Toad rush																										T/0		
Others or unknown			0/0-2			0/0-5			0/0-5										3/0	0/0-5								
FORBS																												
Yarrow																1/0-2										2/T	T/0	
Mountain dandelion													0/0-2															
Veronica spp.																										T/0	1/0	
Milkweed																												
Aster spp.					*/0-3		0/0-1						0/0-2													T/T	T/T	
Arrowleaf balsamroot													0/1-3		0/0-2	0/1-3		*/1-2	0/2-5	0/1-2								
Thistle														1/0													T/0	
Hawksbeard													0/0-2	0/1-2	0/1-3	0/1-3		*/1-3	0/1-3				3/0					
Delphinium spp.								0/1					0/0-3															
Tansy mustard																												
Waterwort																												
Horsetail																										T/0		
Halogeton																												

PRESENT COMPOSITION (%) / POTENTIAL COMPOSITION (%)

ASTERISK (*) SIGNIFIES THAT PERCENT SPECIES COMPOSITION IS NOT KNOWN.
T = trace < 1%
Present composition is by canopy coverage; potential composition is by weight (production).
Potential composition based on USDA, SCS (1965).

TULEDAD-HOMECAMP
STUDY AREA
GRAZING ENVIRONMENTAL STUDY

Table 2-2 (Continued)
VEGETATIVE SPECIES COMPOSITION OF HABITAT TYPES

	BIG SAGE / BLUEBUNCH WHEATGRASS ZONE																											WHITE FIR ZONE
	Shadscale Assns.		Greasewood Assns.		Low Sagebrush Associations					Big Sagebrush Associations														Baltic Rush As.	Aspen Assoc.	Poa / Sedge Associations		Wht. Fir Assoc.
	HT-4	HT-12	HT-2	HT-10	HT-8	HT-21	HT-14	HT-1	HT-17	HT-11	HT-6	HT-5	HT-20	HT-18	HT-16	HT-15	HT-24	HT-22	HT-7	HT-19	HT-9	HT-25	HT-3	HT-23	HT-26	HT-27	HT-13	HT-28
FORBS (continued)																												
Sneezeweed																												
Pennywort																												
Iris																										1/T	2/T	
Povertyweed												1/0									1/0		1/0	T/*			T/0	
Lettuce																												
Duckweed																												
Watercress																												
Evening primrose									T/0														0/0-10	39/*		T/0	3/0	
Beard tongue					*/0-3			T/0					T/1-3			0/1-2			0/2-3	0/1-2								
Perideridia spp.																												
Knotweed																									T/*	T/0	T/0	
Potentilla spp.																										T/0		
Buttercup																										1/T	T/T	
Yellowcress																												
Groundsel													0/0-2															
Checker																												
Blue-eyed grass																												
Dandelion																									T/*	3/T	2/T	
Goat's beard																												
Clover																										1/T	5/T	
Arrowgrass																												
Violets																									7/*			2/*
Death camus																												
Brooklime																										1/0	1/0	
Cheeseweed																										T/0	1/0	
Navarrentia spp.																											T/0	
Dock																T/0								9/*		T/0	T/0	
Cocklebur																											T/0	
Cryptantha spp.									3/0																		T/0	2/*
Common plantain																										4/0		
Nettle																									2/*	2/0		
Filaree																										1/0		
Vetch																										1/0		
Curly dock																										1/0		
Monkey flower																										T/0		
Bull thistle																										T/0	T/0	
Gayophytum																									4/*	T/0		
Lepidium spp.				3/0																								
Mule ears														0/T				*/0-1	T/0	7/0		1/*				1/0		
Lupinus spp.								0/1-3	3/1-5				T/1-4	0/2-5	0/3-5	0/0-2	2/T	*/1-3	11/3-5	1/2-5		2/*			1/*	T/0		11/*
Polygonum spp.																									T/*	1/0		6/*
Spurge																										T/0		
Cudweed																										T/0		
Rumex																										1/0		
Wild buckwheat			7/0		*/0-3	1/T	0/1-3	T/1-5	2/0	T/0			0/1-2	1/1-3	2/0-2	T/0	3/0		T/0			T/*	T/0					
Phlox					*/0-3	7/T	2/1-5	1/T	10/1-2		1/T	1/0	T/1-2	2/1-2	T/0-5	1/1-2	T/T	*/1-2	1/1-3			2/*	2/0					

PRESENT COMPOSITION (%) / POTENTIAL COMPOSITION (%)
ASTERISK (*) SIGNIFIES THAT PERCENT COMPOSITION IS NOT KNOWN.
T = trace < 1%

Present composition is by canopy coverage; potential composition is by weight (production).
Potential composition based on USDA, SCS (1965).

TULEDAD-HOMECAMP
STUDY AREA
GRAZING ENVIRONMENTAL STUDY

Table 2-2 (Continued)
VEGETATIVE SPECIES COMPOSITION
OF HABITAT TYPES

	BIG SAGE / BLUEBUNCH WHEATGRASS ZONE																											WHITE FIR ZONE
	Shadscale Assns.		Greasewood Assns.		Low Sagebrush Associations					Big Sagebrush Associations														Baltic Rush As.	Aspen Assoc.	Poa / Sedge Associations		Wht. Fir Assoc.
	HT-4	HT-12	HT-2	HT-10	HT-8	HT-21	HT-14	HT-1	HT-17	HT-11	HT-6	HT-5	HT-20	HT-18	HT-16	HT-15	HT-24	HT-22	HT-7	HT-19	HT-9	HT-25	HT-3	HT-23	HT-26	HT-27	HT-13	HT-28
FORBS (continued)																												
Anoda cristata																1/0												
Goosefoot																									6/*			T/*
Bedstraw																						T/*			3/*			
Fiddleneck																									1/*			
False Solomon's seal																									T/*			
Puccoon													0/0-2															
Catchfly																						1/*						4/*
Chickweed																									5/*			2/*
Nemophilia spp.																												2/*
Skull cap								0/T																				
Indian paintbrush								0/0-2																				
Nicotiana spp.								0/0-2																				
Globemallow	0/0-5																											
Horsemint																			0/1-2	1/0-5								
Little sunflower																			0/2-5									
Lomatium spp.																			0/2-3									
Geranium																			0/1-2									
Onion							0/0-1												0/0-1									
Granite gilia					*/0-3		0/0-2																					
Goldenhead					*/0-3		0/0-2																					
Sandwort					*/0-3																							
Lathyrus spp.																												
Thelypodium spp.																												
Rabbitfood grass																												
Tapertip hawksbeard							0/1-2		0/1-4																			
Rock clover							0/0-1		0/0-2							0/1-3												
Cutleaf balsamroot							0/0-2		0/1-5					0/3-5														
Locoweed							0/0-2						0/0-2															
Owl clover																0/0-1												
Stone seed																				0/2-5								
Phacelia spp.													0/0-1															
Pussy toes																												
Mustard															0/0-2													
Hoary cress																												
Sky rocket																												
Mariposa lily																												
Blazing star																												
Popcorn flower																												
False hellebore																												
Bassia spp.																												
Other forbs			0/1-5		*/0-5	1/0	1/0	13/0-5	9/1-5				T/0	0/1-3	1/0	1/1-2		*/2-4	6/0	0/3-10	T/0		T/0			1/0	2/0	
Perennials	/0-5	0/1-5		0/1-5		0/10-15	0/2-5			0/5-15	0/5-10	0/5-15					0/5-10				0/5-15		0/2-10			0/10-20	/10-20	
Annuals										0/0-2					0/2-5								0/2-5					

PRESENT COMPOSITION (%) / POTENTIAL COMPOSITION (%)

ASTERISK (*) SIGNIFIES THAT PERCENT COMPOSITION IS NOT KNOWN.
T = trace < 1%
Present composition is by canopy coverage; potential composition is by weight (production).
Potential composition based on USDA, SCS (1965).

TULEDAD-HOMECAMP
STUDY AREA
GRAZING ENVIRONMENTAL STUDY

Table 2-2 (Continued)
VEGETATIVE SPECIES COMPOSITION
OF HABITAT TYPES

TABLE 2-3
HABITAT TYPE CHARACTERISTICS

Habitat Type	% of Study Area	Elevation (Feet)	Precipitation (in.)	Approximate Total Annual Herbage Production (lbs/acre)	
				Less Favorable Years	Favorable Years
HT-4	1	4500 - 5500	5 - 10	150	300
HT-12	3.6	4500 - 5500	6 - 10	250	450
HT-2	2.6	4500 - 6000	5 - 12	500	1,000
HT-10	1	4500 - 6000	6 - 16	1,000	1,700
HT-8	1	6500 - 9000	12 - 16	125	250
HT-21	11.8	5500 - 6500	10 - 14	200	450
HT-14	1.9	5500 - 9000	12 - 16	150	475
HT-1	3.0	5000 - 6500	10 - 16	550	850
HT-17	8.1	5500 - 7500	12 - 16	300	650
HT-11	1	4500 - 5000	8 - 12	250	600
HT-6	10.5	4500 - 5500	8 - 10	300	500
HT-5	1.8	4500 - 5600	7 - 10	400	600
HT-20	14.2	5000 - 6500	8 - 12	600	1,100
HT-18	1.7	4000 - 7500	12 - 16	650	900
HT-16	1	5500 - 7000	10 - 14	750	1,250
HT-15	2.0	5000 - 7000	12 - 14	650	1,050
HT-24	1	5500 - 7500	12 - 16	600	1,000
HT-22	1	4200 - 5500	12 - 16	750	1,250
HT-7	21.2	5500 - 7500	12 - 16	750	1,550
HT-19	1	6000	16 - 25	900	1,500
HT-9	1	4500 - 6000	8 - 12	1,300	3,000
HT-25	1	6000 - 8000	14 - 24	Unknown	Unknown
HT-3	1	5500 - 7500	12 - 14	300	800
HT-23	1	5500 - 7500	12 - 14	Variable	Variable
HT-26	1	6000 - 8500	12 - 16	Unknown	Unknown
HT-27	1	4000 - 6500	6 - 20	2,000	3,000
HT-13	1	4000 - 6500	6 - 20	2,000	3,000
HT-28	1	5500 - 8000	20 - 30	Unknown	Unknown

wheatgrass zone. It occupies 14 percent of the total land area and occurs on moderately drained loamy soils. The other associations occur as edaphic, topographic, or topoedaphic climaxes. The following discussion proceeds in the same order as the habitat types are presented in TABLE 2-1, from dry conditions to wet conditions.

Shadscale Associations

The shadscale associations are edaphic climaxes occurring on the driest sites at lower elevations. They usually are found along a gradient between the greasewood associations at the lowest elevations and the big sagebrush associations on the alluvial fans above. The soils are rather impervious and the ground sloping, so that runoff is high. These factors, combined with slightly lower precipitation and higher soil salt concentrations than the sagebrush associations, make the shadscale habitat types the driest communities in the big sage/bluebunch wheatgrass zone. They occupy about 4 percent of the Tuledad/Home Camp Study Area.

SHADSCALE/INDIAN RICEGRASS HABITAT TYPE (HT–4)

This type occurs on gently sloping alluvial fans and lake terraces. The soils are dry and alkaline. They are excessively drained and are unable to absorb and store much soil moisture. A platy vesicular surface layer inhibits infiltration.

Presently, budsage, greasewood, and shadscale are the dominant species with lesser amounts of horsebrush, spiny hopsage, big sagebrush, and rabbitbrush. Grasses and forbs have been eliminated from the understory of most stands, and over 80 percent of the ground surface is bare.

SHADSCALE/BIG SAGE HABITAT TYPE (HT–12)

This type occurs on gently sloping lake terraces and alluvial fans. Soils are droughty loams underlain at depths of 10 to 20 inches by bedrock, hardpan, or loose beach gravel.

Presently, big sagebrush is the dominant species with lesser amounts of budsage, greasewood, shadscale, and spiny hopsage. Not only has shadscale been reduced, but Indian ricegrass has been eliminated from most stands and squirreltail from many. Over 70 percent of the ground surface is bare.

Greasewood Associations

The greasewood associations are edaphic climaxes that generally occur at the lowest elevations, rimming the dry lakebeds of enclosed basins. Although they often receive considerable runoff in the spring and the water table is usually within about 15 feet of the surface, summer drought and high soil salt concentrations combine to make these habitat types dry during much of the year. Greasewood habitat types comprise about 3 percent of the land area of study area.

GREASEWOOD/GREAT BASIN WILDRYE HABITAT TYPE (HT–2)

This type occurs on level to gently sloping broad flood plains, terraces, and wide alluvial fans and receives about 5 to 12 inches of precipitation annually. Additional moisture is often received as surface flow in the spring. Soils are saline-alkali, slowly permeable, and moderately well-drained. Most have thin, platy, light-colored fine sandy loam or silty clay loam surface layers. Subsoils are slowly permeable sodic clays. The platy surface and slowly permeable subsoils result in low infiltration and high runoff rates.

Presently, greasewood and big sagebrush are the dominant species with lesser amounts of shadscale, budsage, and horsebrush. Great Basin wildrye and other perennial grasses have nearly been eliminated from most stands. Cheatgrass now dominates the herbaceous understory, and about 70 percent of the ground surface is bare.

GREASEWOOD/SALTGRASS HABITAT TYPE (HT–10)

This type occurs on level or nearly level flood plains and low stream terraces. It receives 6 to 16 inches of precipitation annually. Additional moisture is often received as surface flow or seasonally high water tables in the spring. Soils are saline-alkali, poorly to very poorly drained, and have a fine sandy loam to clay surface layer. They are moderately deep to very deep. The high soil salt concentration makes this habitat physiologically dry.

Presently, greasewood and suaeda are the dominant species with lesser amounts of shadscale. Perennial grasses have been eliminated from most stands, and over 80 percent of the ground surface is bare.

Low Sagebrush Associations

The low sagebrush associations are edaphic and topoedaphic climaxes that occur throughout the elevational range of the big sage/bluebunch wheatgrass zone, some extending into the white fir zone. They are characterized by very shallow rooting zones. Lack of depth, often combined with high clay content, makes these habitat types droughty. Low sagebrush, rabbitbrush, and perennial grasses are the dominant plants. Low sagebrush habitat types comprise about 25 percent of the land area of the Tuledad/Home Camp Study Area (TABLE 2-3).

LOW SAGE/SANDBERG BLUEGRASS HABITAT TYPE (HT–8)

This type occurs on gently sloping, high, windswept mountain ridges. It receives 12 to 16 inches of precipitation annually. However, much of the precipitation occurs as snow and the exposed position of this habitat type leads to considerable moisture loss through blowing winds. Soils are shallow, gravelly, or cobbly loams with a clayey subsoil over bedrock. The gravelly texture, wind losses, and lack of depth make these communities droughty.

The present vegetation of this habitat type has not been investigated because it is restricted to private lands. Present condition and trend are not known.

LOW SAGE/BLUEGRASS-SQUIRRELTAIL HABITAT TYPE (HT–21)

This type occurs on gently sloping tablelands and plateaus. Soils have gravelly sandy loam or fine sandy loam surface layers and a shallow subsoil of gravelly clay over a clay or silica-cemented hardpan at a depth of 8 to 30 inches. Lack of depth and high clay content combine to make these soils droughty.

Presently, low sagebrush and bluegrasses are the dominant species with lesser amounts of phlox, rabbitbrush, squirreltail, and Idaho fescue. About 64 percent of the ground surface is bare.

LOW SAGE/IDAHO FESCUE-SANDBERG BLUEGRASS HABITAT TYPE (HT–14)

This type occurs on gently sloping to steep mountain slopes. Soils are shallow gravelly loams with a clayey subsoil over bedrock at a depth of 6 to 24 inches. Low water-holding capacity and infiltration rates make these soils droughty.

Presently, low sagebrush and bluegrasses are the dominant plants with lesser amounts of rabbitbrush and squirreltail. Perennial forbs and Idaho fescue have been greatly reduced. About 57 percent of the ground surface is bare.

LOW SAGE-RABBITBRUSH HABITAT TYPE (HT–1)

This type occurs on nearly level to moderately sloping basaltic tablelands. Soils are dark reddish brown, cobbled clay that are subject to extreme swelling and shrinking. The surface layers tend to slough into wide cracks that are frequent when the soil is dry. The continual, active soil movement damages the roots of many plants and precludes the establishment of species that would otherwise inhabit these communities.

Presently, low sagebrush is the dominant species in most stands with lesser amounts of bluegrasses, juniper, big sagebrush, rabbitbrush, cheatgrass, squirreltail, and miscellaneous forbs. About 23 percent of the ground surface is bare.

LOW SAGE/IDAHO FESCUE HABITAT TYPE (HT–17)

This type occurs on gently to moderately sloping basaltic tablelands. Soils have a thin cobbled loam surface layer underlain by dense, heavy clay and bedrock at a depth of 10 to 40 inches. The heavy clay limits the development of plant roots and restricts available moisture to the surface layers.

Presently, low sagebrush is the dominant species with lesser amounts of bluegrasses, phlox, cheatgrass, squirreltail, miscellaneous forbs, and occassional junipers (FIGURE 2-1). Idaho fescue has been severely reduced. About 40 percent of the ground surface is bare.

Big Sagebrush Associations

Big sagebrush associations occupy 51 percent of the study area (MAP 2-1). Soils are generally deep, well-drained loams. The big sage/ bluebunch wheatgrass association is the climatic climax of the Tuledad/Home Camp Study Area. Other big sagebrush associations occur as edaphic or topographic climaxes throughout the elevational range of the big sage/bluebunch wheatgrass zone and into the white fir zone.

BIG SAGE/INDIAN RICEGRASS HABITAT TYPE (HT–11)

This type occurs on gently sloping, partially stabilized sand dunes. Soils are deep, windblown fine sands. Infiltration and percolation rates are high. Water-holding capacity is low, but evaporation and runoff losses are negligible, and soil water is freely available to plants. The low fertility and loose, unstable surface soils restrict the development of plant communities in this habitat type.

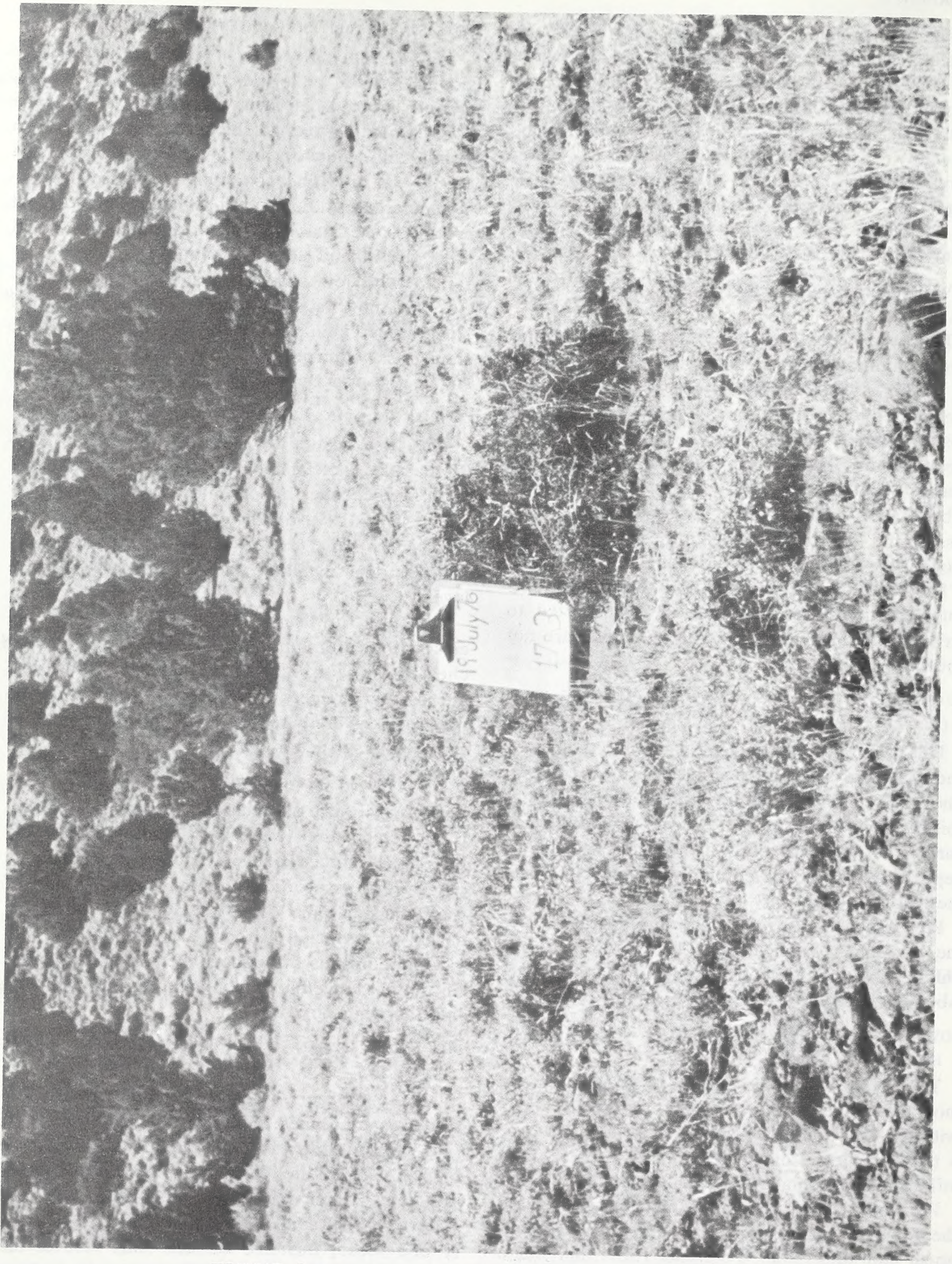


FIGURE 2-1. Low sage/Idaho fescue community
in "fair" condition.

Presently, big sagebrush and horsebrush are the dominant species with lesser amounts of spiny hopsage, rabbitbrush, greasewood, and four-wing saltbrush. Indian ricegrass has been severely reduced but remains a component of many stands. Almost 80 percent of the ground surface is bare.

BIG SAGE/SQUIRRELTAIL-INDIAN RICEGRASS (HT-6)

This type occurs on gently to moderately sloping terraces and fans. Soils usually have a vesicular surface layer with clay loam subsoils overlying a fractured silica-cemented zone 12 to 20 inches below the surface.

Presently, big sagebrush is the dominant species with lesser amounts of squirreltail, spiny hopsage, and horsebrush. Indian ricegrass has been nearly eliminated in most stands, and cheatgrass dominates the herbaceous understory of many. About 67 percent of the ground surface is bare.

BIG SAGE/GREAT BASIN WILDRYE HABITAT TYPE (HT-5)

This type occurs on nearly level flood plains along intermittent drainageways. Runoff is received from surrounding areas. Soils are deep, silty to clayey in texture, and subject to sunbaking. Low infiltration rates result in relatively high runoff rates.

Presently, big sagebrush is the dominant species with lesser amounts of horsebrush, squirreltail, and spiny hopsage. Great Basin wildrye has been eliminated from most stands and cheatgrass is the dominant herbaceous species of many. About 67 percent of the ground surface is bare.

BIG SAGE/BLUEBUNCH WHEATGRASS HABITAT TYPE (HT-20)

The big sage/bluebunch wheatgrass habitat type is the climatic climax of the Tuledad/Home Camp Study Area. This type occurs on rolling uplands, gently sloping terraces, and alluvial fans. Soils are deep with dark loamy surface layers and clay loam subsoil. They present no limitations for plant establishment and growth. Macroclimate is the major factor determining the climax vegetation.

Presently, big sagebrush is the dominant species with much lesser amounts of bluegrasses, squirreltail, Idaho fescue, and rabbitbrush (FIGURE 2-2). Bluebunch wheatgrass has nearly been eliminated from most stands. About 57 percent of the ground surface is bare.

BIG SAGE/BLUEBUNCH WHEATGRASS-GREAT BASIN WILDRYE HABITAT TYPE (HT-18)

This type occurs on steep south-facing slopes. Soils are shallow and stony, with a surface layer of stony loam over a subsoil of stony clay and bedrock at a depth of 20 to 40 inches. Infiltration rates are moderate.

Presently, big sagebrush is the dominant species, with lesser amounts of cheatgrass, bluegrasses, squirreltail, Idaho fescue, and rabbitbrush. Bluebunch wheatgrass, Great Basin wildrye, and Thurber needlegrass have been eliminated from many stands, and cheatgrass is the dominant herbaceous species. About 47 percent of the ground surface is bare.

BIG SAGE/BLUEBUNCH WHEATGRASS-THURBER NEEDLEGRASS HABITAT TYPE (HT-16)

This type occurs on moderate to steep mountain slopes having southerly exposures. Soils are deep gravelly loams. Infiltration rates are high, but water storage capacity is low.

Presently, big sagebrush is the dominant species with lesser amounts of squirreltail, cheatgrass, bluegrasses, Idaho fescue, rabbitbrush, bluebunch wheatgrass, very few forbs, and trace amounts of Indian ricegrass. About 56 percent of the ground surface is bare.

BITTERBRUSH-BIG SAGE/BLUEBUNCH WHEATGRASS HABITAT TYPE (HT-15)

This type occurs on gently to steeply sloping lava tablelands and hills. Soils have a thin stony loam surface layer over a subsoil of heavy clay and fractured bedrock at 16 to 22 inches below the surface. The clay subsoil hinders rooting to some degree, but water is more freely available to roots that enter the fractured bedrock.

Presently, big sagebrush and juniper are the dominant species with lesser amounts of bitterbrush, cheatgrass, Idaho fescue, and squirreltail. Bluebunch wheatgrass has been severely reduced and nearly eliminated from many stands. About 30 percent of the ground surface is bare.

JUNIPER/BIG SAGE/BLUEBUNCH WHEATGRASS HABITAT TYPE (HT-24)

This type occurs on moderate to steep mountain slopes. Soils are very stony clay loams, typically 20 to 40 inches deep. Small scattered patches of very shallow soils, rock outcrops, and rubble spots occur in this habitat type.

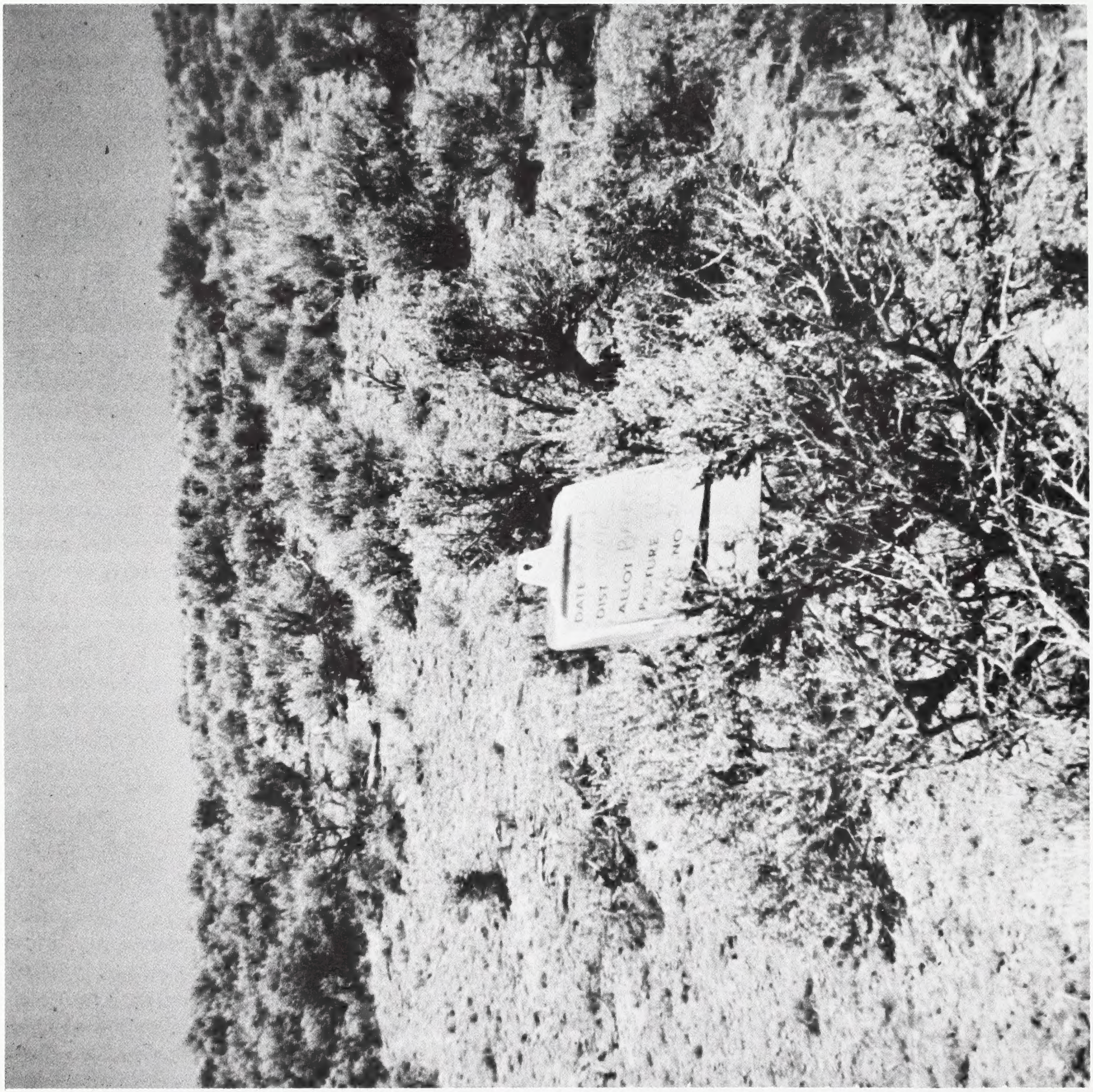


FIGURE 2-2. Big sage/bluebunch wheatgrass community in "fair" condition.

Presently, big sagebrush and bluegrasses are the dominant species with lesser amounts of juniper, bluebunch wheatgrass, Idaho fescue, squirreltail, low sagebrush, cheatgrass, rabbitbrush, horsebrush, and buckwheat. Low sagebrush is a much more conspicuous component of this habitat type than the SCS range-site description indicates. Bluebunch wheatgrass has been greatly reduced; bluegrasses and cheatgrass now dominate the herbaceous understory of most stands. About 28 percent of the ground surface is bare.

BITTERBRUSH-BIG SAGE/BLUEBUNCH WHEATGRASS-IDAHO FESCUE HABITAT TYPE (HT–22)

This type occurs on nearly level to steeply sloping alluvial fans and terraces. Soils are deep, well-drained gravelly sandy loams to loams. Infiltration and percolation rates are high.

The association is dominated by bluebunch wheatgrass and bitterbrush with lesser amounts of big sagebrush, Idaho fescue, other perennial grasses and forbs, and occasional junipers, rabbitbrush, and serviceberry.

Since this habitat type occurs only on privately owned lands, its present vegetation has not been investigated.

BIG SAGE/IDAHO FESCUE HABITAT TYPE (HT–7)

This type occurs on gently sloping to steep mountainous slopes. Soils are deep, moderately drained loams, clay loams, or clays. They are able to absorb and store all available precipitation and pose no limitations for plant growth and establishment.

Presently, big sagebrush is the dominant species with lesser amounts of bluegrass, squirreltail, and various other species (FIGURE 2-3). Idaho fescue and bluebunch wheatgrass have been severely reduced or nearly eliminated from many stands. Bluegrasses and squirreltail are now the most characteristic grasses. Lupine is a very conspicuous component of many stands. About 40 percent of the ground surface is bare.

BIG SAGE-SNOWBERRY/IDAHO FESCUE HABITAT TYPE (HT–19)

This type occurs on moderate to steep slopes, usually with a northerly or northeasterly exposure. Soils are deep stony loams, presenting no limitations to vegetation. The generally high elevations and northerly exposures of this habitat type maximize the benefit of moisture by reducing loss from rapid snowmelt and evaporation.

Big sagebrush is presently the dominant species, with lesser amounts of squirreltail, snowberry, gooseberry, and miscellaneous forbs and perennial grasses. Idaho fescue and bluebunch wheatgrass have been severely reduced or nearly eliminated from most stands. About 23 percent of the ground surface is bare.

BIG SAGE-SILVER SAGE/GREAT BASIN WILDRYE HABITAT TYPE (HT–9)

This type occurs on smooth, nearly level flood plains along intermittent drainages. It receives runoff from adjacent areas in the spring. Soils are deep silty clays. Water-holding capacity is high, but infiltration rates are greatly reduced if the vegetative community is disturbed and the soil surface is subject to sun-baking.

Presently, silver sagebrush and rabbitbrush are the dominant species, with lesser amounts of big sagebrush, mat muhly, sedge, bluegrasses, some Great Basin wildrye, and a few annual forbs. About 56 percent of the ground surface is bare.

Other Associations

Several other types of associations occur as edaphic and topoedaphic climaxes throughout the big sage/bluebunch wheatgrass zone. The curlleaf mountain mahogany/big sage/Idaho fescue and aspen habitat types are topoedaphic climaxes; and the silver sage/Nevada bluegrass, baltic rush, willow/Nevada bluegrass, and Nevada bluegrass-sedge habitat types are edaphic climaxes.

CURLLEAF MOUNTAIN MAHOGANY/BIG SAGE/IDAHO FESCUE HABITAT TYPE (HT–25)

This type occurs on gently to steeply sloping mountainous uplands and ridgetops. Soils are well-drained sandy loams to clay loams formed in residuum and colluvium weathered from basalt, andesite, and tuff, usually occurring on rocky outcrops and ridgetops.

The curlleaf mountain mahogany communities in the Tuledad/Home Camp Study Area all are surrounded by the big sage/Idaho fescue habitat type. It appears that curlleaf mountain mahogany is well adapted for establishment and success on rocky outcrops within the big sage/Idaho fescue habitat type.

Dealy (1975) believed that curlleaf mountain mahogany was a climax component only on rocky outcrops, where protection is afforded from fire, but that it extended into adjacent communities in accordion-like fashion in response to periodic

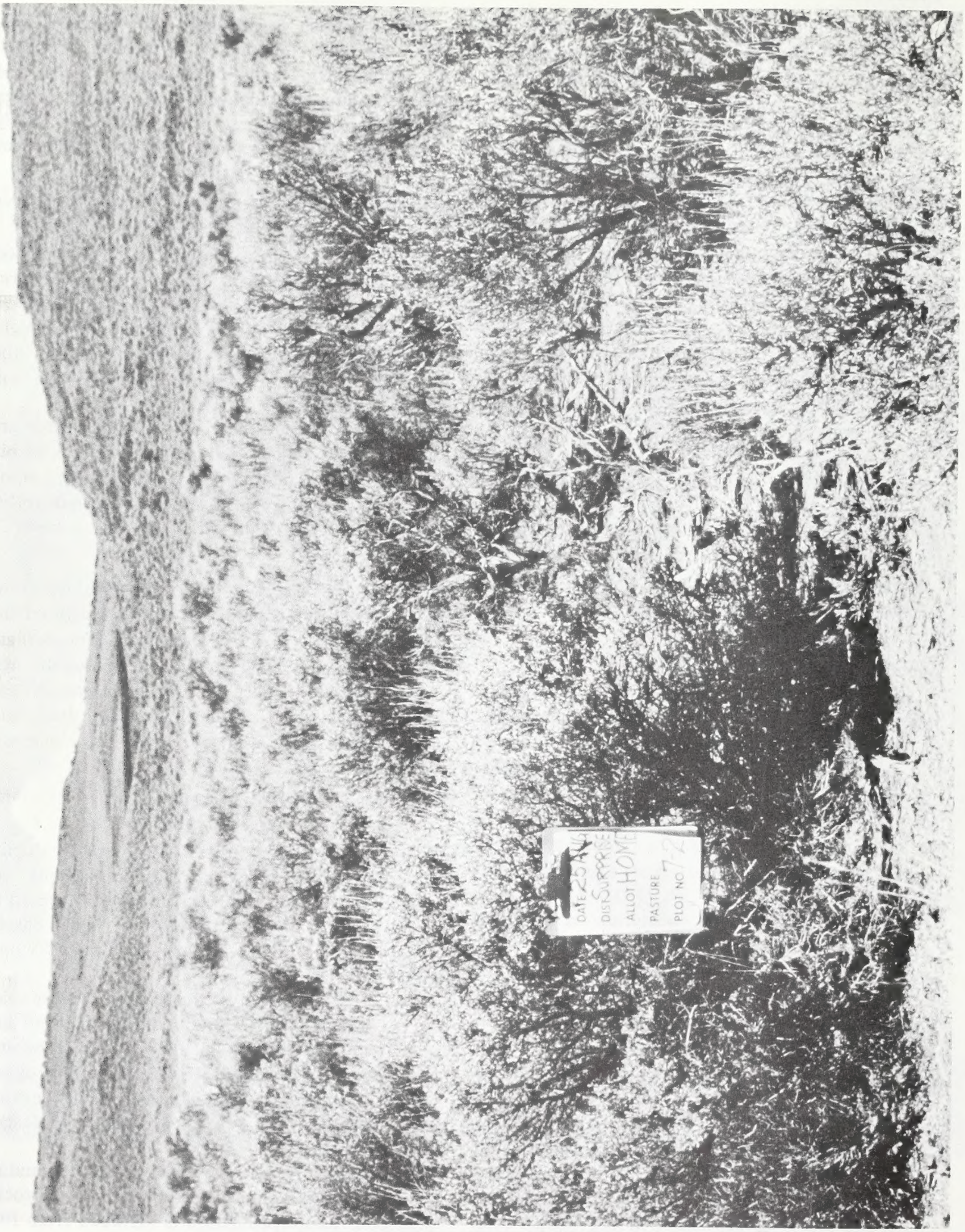


FIGURE 2-3. Big sage/Idaho fescue community in "fair" condition.

fires. Scheldt (1969) and Dealy both believed that the high cattle numbers and low deer numbers present at the turn of the century created a situation advantageous for the widespread establishment and success of curlleaf mountain mahogany in adjacent communities. Cattle grazing opened up the adjacent bunchgrass communities; low deer numbers improved the chance for seedling success, since deer are heavy users of young mahogany plants.

Presently, the canopy coverage of most curlleaf mountain mahogany communities is much greater than 45 percent and many communities have extended their range into the adjacent big sage/Idaho fescue habitat type. The understory is very similar to the understory of the present big sage/Idaho fescue habitat type. Big sagebrush and squirreltail are the dominant species, with lesser amounts of bluegrass, a variety of forbs and other perennial grasses, gooseberry, snowberry, and rabbitbrush. Idaho fescue has been nearly eliminated from most stands. Only about 9 percent of the ground surface is bare.

Dealy described a Sandberg bluegrass successional stage of the curlleaf mountain mahogany/big sage/Idaho fescue association that was very similar to the present understory composition of this habitat type in the Tuledad/ Home Camp Study Area. He believed that the dominance of bluegrass over Idaho fescue was the result of livestock grazing pressure. Sandberg bluegrass matures earlier than Idaho fescue. Therefore, livestock grazing pressure, which in this habitat type generally reaches a peak after Sandberg bluegrass seedripe but before Idaho fescue seed-ripe, leaves Idaho fescue with a competitive disadvantage. The same situation is probably also responsible for the dominance of bluegrass over Idaho fescue in the big sage/ Idaho fescue habitat type.

SILVER SAGE/NEVADA BLUEGRASS HABITAT TYPE (HT–3)

This type occurs in enclosed basins having nearly level floors. It is frequently inundated by spring runoff. Soils are deep, self-churning clays. When dry, the surface layers slough into the frequent wide cracks. The continual, active soil movement and periodic flooding restrict the suitability of this habitat type for many plants.

Presently, this type is dominated by silver sagebrush, with lesser amounts of mat muhly, western wheatgrass, and miscellaneous other herbaceous species. About 66 percent of the ground surface is bare.

BALTIC RUSH HABITAT TYPE (HT–23)

This type occurs in nearly level enclosed basins. Soils are similar to those of the silver sage/Nevada bluegrass habitat type. However, baltic rush communities are inundated for considerably longer periods of time in the spring. These inundations are of sufficient length to prohibit the growth of most perennial plants other than baltic rush.

Since the length of inundation is such an important factor in this habitat type, the species composition and productivity vary widely from year to year. Limited SCS data from 1968, 1969, and 1970 showed a mean annual aboveground net community production of about 1,100 pounds per acre, ranging from 0 in the least favorable year to 2,591 in the most favorable year.

Presently, baltic rush is the dominant species in this habitat type. It is very resistant to grazing pressures; it is doubtful that grazing has had (or presently has) a significant effect on the condition of this habitat type.

ASPEN HABITAT TYPE (HT–26)

This type occurs on moderate to steep mountainous slopes, in basins and pockets, and on ridges. Soils are gravelly sandy loams, usually with fractured tuff bedrock at a depth of about 50 inches below the surface.

Understory vegetation and aspen density vary considerably from stand to stand, reflecting differences in site characteristics and grazing use. Gooseberry and mountain brome are the dominant species with lesser amounts of oniongrass, violets and miscellaneous annual forbs, big sagebrush, and snowberry (FIGURE 2-4). Total understory canopy coverage averages about 20 percent; and about 33 percent of the ground surface is bare. Despite vigorous root sprouting by mature trees, a sprout rarely survives to a size beyond the reach of ungulates. As older trees eventually die without replacement, the overstory canopy is opened up, resulting in the invasion of plants characteristic of adjacent communities and the eventual elimination of the aspen community.

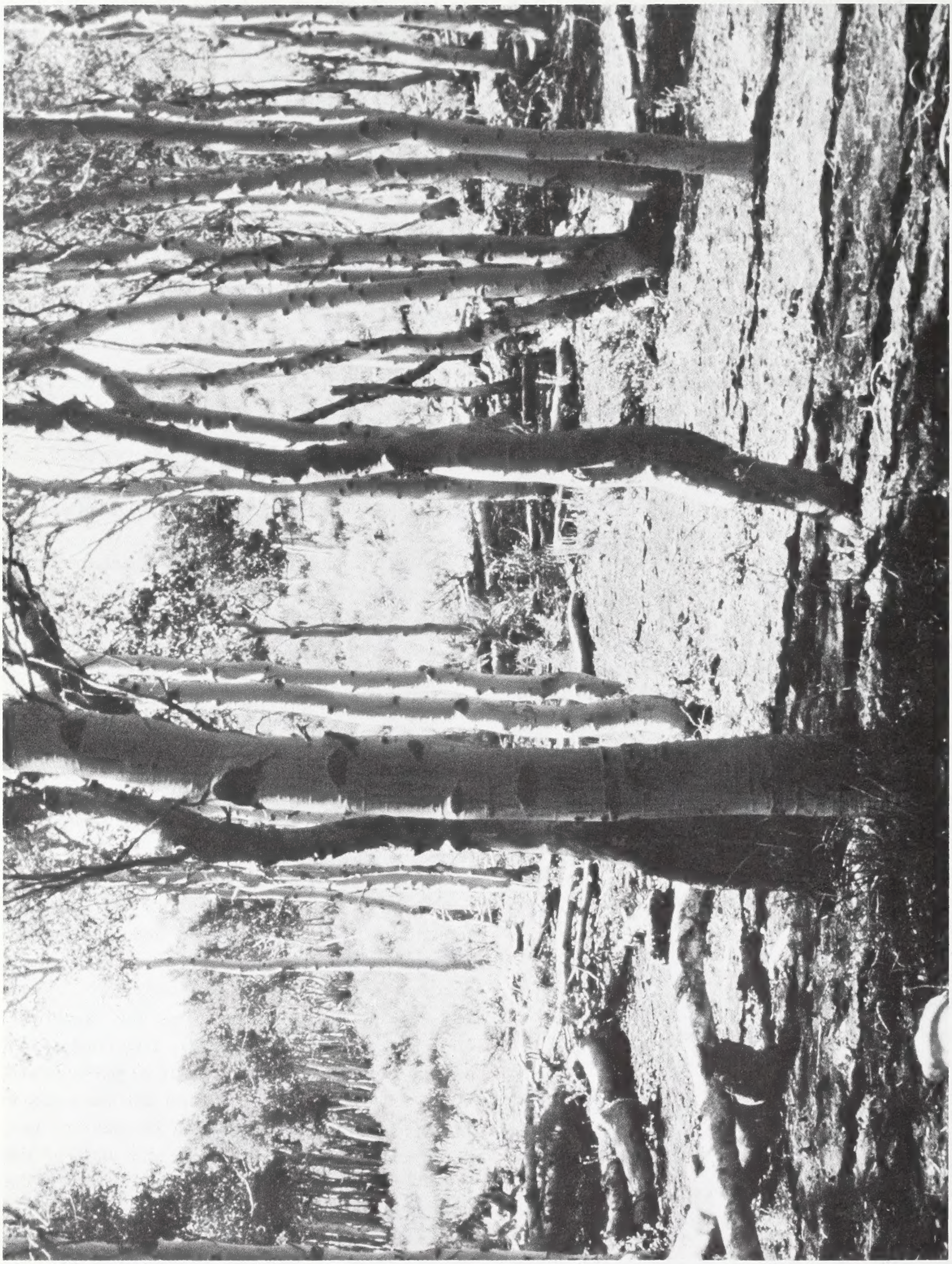


FIGURE 2-4. Aspen community in "poor" condition. Note the absence of successful aspen reproduction.

WILLOW/NEVADA BLUEGRASS HABITAT TYPE (HT–27)

This type occurs along slightly sloping to moderately sloping streams. It receives moisture from surface runoff and seepage from springs. Soils are wet sandy to clayey loams over 20 inches deep. Water is usually freely available throughout the growing season.

Both the willow/Nevada bluegrass and the Nevada bluegrass-sedge habitat types have been considered together and described as one range site (NV23-13, semiwet meadow) by Summerfield and Bagley (1974). They have been considered separately in the present classification to differentiate between riparian habitat occurring along streams and habitat occurring at seeps. The vegetative communities are very similar, the distinction being that willows are a conspicuous component of the riparian association. This habitat type is extremely productive.

The condition of this type has severely deteriorated under livestock grazing. These communities serve as concentration areas for cattle and are subjected to intense grazing pressures since they provide permanent water and green forage throughout the grazing season and are usually the major natural trailing route for cattle movements. The willow/Nevada bluegrass habitat type occurs scattered throughout the Tuledad/Home Camp Study Area, but on public lands, willow-dominated communities have nearly been eliminated. They are presently limited to only a few remaining areas, principally Selic Canyon, Alaska Canyon, Barber Creek, Bare Creek, and Cottonwood Creek. Even these communities are in only "fair" range condition. Bluegrass, big sagebrush, and willow are the dominant species with lesser amounts of a host of other species. Species diversity is far greater in these communities than any others. Despite the availability of water, however, shrubs and juniper have invaded.

Trend of the few remaining willow-dominated communities is downward. Successful willow reproduction is a serious problem, since sprouts are repeatedly grazed to the ground. About 25 percent of the ground surface is bare, a situation conducive to unpalatable shrub establishment and accelerated soil erosion.

Except for the few remaining willow-dominated communities described above, the vegetation of this habitat type presently exists in severe stages of retrogression—from silver sage-big sage/sedge communities to a big sage disclimax with little or no understory.

NEVADA BLUEGRASS-SEDGE HABITAT TYPE (HT–13)

This type occurs at springs and seeps throughout the study area. Soils are wet sandy to clayey loams over 20 inches deep. Water is usually freely available throughout most of the growing season, though some drying up around the peripheries often occurs in late July or August.

The association is very similar to that of the willow/Nevada bluegrass habitat type, except that willows are uncommon.

These communities are subjected to the same types of pressure as are the willow/Nevada bluegrass communities. Accelerated soil erosion and shrub invasion are the principal problems. Big sagebrush, baltic rush, and sedges are presently the dominant species with lesser amounts of bluegrass, dandelion, evening primrose, silver sagebrush, rabbitbrush, mat muhly, and a host of other species, many of which are annuals. Despite the availability of water, about 43 percent of the ground surface is bare.

THE WHITE FIR ZONE

The white fir zone occurs at elevations greater than about 7,600 feet in the Warner Mountains of the Tuledad portion of the study area. Precipitation is sufficiently great to support true forest vegetation and cooler temperatures further increase the effectiveness of available moisture.

White Fir Habitat Type (HT–28)

This type is the only association of the white fir zone, and extends as a topographic climax into the higher elevations of the big sage/bluebunch wheatgrass zone. The habitat type occurs on nearly level to very steep mountainous slopes. Soils are sandy loams with bedrock about 30 inches below the surface.

Presently, this habitat type is in "good" to "excellent" condition. Most white fir forests in the Tuledad portion of the study area are in climax or near climax conditions, free from effects of fire and logging. Although the white fir communities receive considerable deer use, livestock use is very light. The overstory is dense, dominated exclusively by white fir. The understory is sparse (less than 5 percent total canopy cover). Grasses are the most abundant, with needlegrass, oniongrass, bluegrasses, and squirreltail being most common. Forbs vary widely from stand to stand but generally are annual forbs. Perennials are poorly represented. Snowberry and serviceberry are the most common shrubs. The trees have fairly even age distributions, characteristic of self-perpetuating climax forests. Differences in tree density, basal area, and understory composition reflect differences in site characteristics. Only about 6 percent of the ground surface is bare.

Threatened and Endangered Plant Species

No threatened or endangered plant species have been found or are known to exist in the study area.

Poisonous Plants

There are small scattered stands of posionous plants in the study area. Known species of poisonous plants throughout the study area include larkspur and halogeton. In addition, one stand of milkweed of approximately 10 acres was found along Wall Canyon Creek.

Range Seedings

Approximately 4,076 acres in the study area have been seeded with crested wheatgrass. In the Wall Canyon Allotment (seeding pasture), 3,076 acres were disc-plowed and seeded in 1965. Approximately 1,000 acres in the Home Camp Allotment (Hart Camp pasture) were treated with brush cutters and seeded in 1961. Acreages of habitat types affected are as follows: 10 acres in HT-3, 282 acres in HT-5, 2,266 acres in HT-20, and 518 acres in HT-21 in the Wall Canyon Allotment and 1,000 acres in HT-20 in the Home Camp Allotment.

The current livestock forage production of the Wall Canyon seeding averages approximately 260 pounds per acre in less favorable years and 525 pounds per acre in favorable years. The seeding in the Home Camp Allotment produces approximately 300 pounds of livestock forage per acre in less favorable years and 600 pounds per acre in favorable years.

Range Conditions and Trends

The term "range condition," as used in this text, is an ecological rating, an expression of degree of departure from climax. It does not imply desirability for a particular use (e.g., livestock production, deer habitat, watershed values). What may constitute good range for cattle could be poor range for deer or vice versa. Therefore, the condition of the range for particular uses must be judged separately. Four classifications of range conditions are commonly used: excellent (76-100 percent of climax species composition), good (51-75 percent of climax composition), fair (26-50 percent of climax composition), and poor (0-25 percent of climax composition). The term "trend" is simply the direction of change in vegetation, toward or away from climax. As with range condition, trend can be favorable or unfavorable depending on the requirements of uses.

The range conditions and trends are average conditions and trends for each habitat type. The condition and trend of each vegetative community in every allotment is prohibitively expensive to determine. Although such information would be highly desirable, the time involved for adequate sampling of each community and the value of trend data collected at only one point in time make such an approach unfeasible for large land areas. Therefore, the average condition of a habitat type is a single expression of what actually is a range of conditions. The expression of trend is similar.

The most valuable trend data are derived from measurements taken at the same place at two or more points in time. Trend data collected at only one point in time are indications of trend, and are actually an expression of condition at one point in time. The data presently available for assessing trend in the study area are quite limited, except for certain habitat types (e.g., aspen and Nevada bluegrass-sedge habitat types; see APPENDIX F).

Certain major conclusions concerning the vegetation, however, are apparent.

(1) No significant differences were demonstrated to exist in the average condition of allotments (TABLE 2-4). No one allotment could be singled out as being in any better or worse condition than another. All allotments had an average condition of fair.

(2) Highly significant differences were demonstrated in the average conditions of habitat types described as range sites by Summerfield and Bagley (1974), and these differences lend credibility to the distinctions between poor, fair, and excellent condition classes. The greasewood/saltgrass and big sage-silver sage/Great Basin wildrye habitat types were in poor condition. The low sage/bluegrass-squirreltail habitat types were in excellent condition. The

TABLE 2-4
Condition Classes and Mean Percentage of Climax Composition of Habitat Types Described as Range Sites by Summerfield and Bagley (1974)

Habitat Type No. HT-	10	9	1	2	18	19	20	13	11	4	24	5	12	7	15	14	17	6	15	3	21
Condition Class 1/	P	P	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F 2/	F 2/	E
Sample Size n 3/	3	2	4	6	4	4	8	11	5	3	3	8	6	6	5	4	6	7	3	3	5
Mean Percentage of Climax Composition	7.3	22.0	29.8	31.8	32.5	34.3	34.4	35.7	36.6	37.7	40.7	40.8	41.7	42.6	44.0	45.5	46.5	49.4	52.3	58.3	80.2

1/ P = poor, F = fair, E = excellent

2/ Although the mean percentage of climax composition of these habitat types is greater than 50 percent, a condition class of fair has been assigned, because the means are not significantly different from most of the others in "fair" condition.

3/ Number of stands sampled.

NOTE: Means underscored by the same line are not significantly different ($\alpha = 0.05$). Mean percentage of climax composition of HT-8, 22, 23, 25, 26, 27, 28 could not be calculated due to reasons explained in the text (page 2-36). From APPENDIX majority of the habitat types described as range sites were in fair condition (TABLE 2-4).

(3) Range trend generally appeared to be upward (TABLES 2-5 to 2-8). The Home Camp Allotment and the big sage/Great Basin wildrye, big sage/ bluebunch wheatgrass, and low sage/Idaho fescue habitat types showed the strongest indications of upward trends. The shadscale-big sage and the Nevada bluegrass-sedge habitat types exhibited downward trends. No other allotment or habitat types identified as range sites by Summerfield and Bagley (1974) could be singled out as exhibiting definite trends. Taken all together, a general upward trend was indicated, but the evidence is not strong. Perhaps the single most valuable interpretation of the data is that a downward trend was not indicated for the majority of habitat types.

(4) The aspen habitat type is in poor condition with a downward trend. A forb-depleted understory and failure of aspen regeneration are the most critical problems.

(5) The willow/Nevada bluegrass habitat type has been severely impacted by past grazing pressures. Only a few remnants of this association remain and the trend of these is downward.

(6) The baltic rush habitat type is very resistant to grazing pressure. Species composition and productivity are related almost entirely to the length of time the community is inundated in the spring. Trend is probably static.

(7) The white fir habitat type receives only very light livestock use. It is probably in good to excellent condition with a static trend.

(8) Unsystematic livestock grazing has apparently lead to conversion of an Idaho fescue dominated herbaceous understory to a bluegrass and squirreltail dominated herbaceous understory in the curlleaf mountain mahogany habitat type. Mountain mahogany reproduction has been unsuccessful under its own canopy, but has been more successful in openings and along the periphery of the communities. The young plants are heavily hedged, but because mountain mahogany is especially long-lived (400 to 600 years), short-term unsuccessful reproduction may have no effect on long-term regeneration.

(9) Bitterbrush and mountain mahogany browse ranges were generally in unsatisfactory condition in relation to degree of hedging and browse availability to ungulates. Bare and Tuledad Allotments stood out as definitely being in unsatisfactory condition. The data were not as conclusive for Home Camp and Selic-Alaska Canyon Allotments, but an unsatisfactory condition was indicated. The strongest trend exhibited was a downward trend in the Cottonwood pasture of Tuledad Allotment. However, when bitterbrush was analyzed separately, a general downward trend was evident, with strongest evidence in the Home Camp Allotment and the Cottonwood pasture of the Tuledad Allotment.

(10) Most of the range of the Tuledad/Home Camp Study Area is in fair condition with a static or upward trend. Certain habitat types, however, are in downward trends. Though limited to only a very small portion of the total land area, the Nevada bluegrass-sedge, willow/Nevada bluegrass, and aspen habitat types are some of the most valuable for wildlife and aesthetics.

The determination of condition and apparent trend of habitat types shown on TABLES 2-4 and 2-7 is limited to those habitat types which are described as range sites by Summerfield and Bagley (1974), i.e., HT-1 to 24. The range site descriptions provide a comparable quantitative description of climax plant communities for individual habitat types within the study area. These descriptions are used for comparison with existing communities to determine ecological condition and apparent trend. Condition and trend of HT-8 and 22 are not included since they occur only on private land and were not inventoried. Condition and trend are not included for HT-23 since vegetative composition is highly variable due to fluctuating water levels. Habitat types 8, 22, 23, 25, 26, 27, and 28, which are not included on these tables, make up less than 3 percent of the study area.

APPENDIX F contains a more detailed description of procedures and interpolations of condition and trend data.

CLIMATE

Most of the following information was adapted from *Surprise Valley—Home Camp Area, California-Nevada* (U.S. Dept. Agr., et al., 1974).

Precipitation

Average yearly precipitation ranges from less than six inches at the lower elevations of Surprise Valley to about 22 inches at the higher elevations along the east flank of the Warner Mountains. MAP 2-2 shows the average annual precipitation variations over the study area.

TABLE 2-5
MEAN RANGE CONDITION OF ALLOTMENTS

Allotment[2]	Mean Range Condition (% of climax)	Sample Size n[1]
Denio	47.7	3
Wall Canyon	42.8	6
Bare Ranch	45.7	27
Lower Lake	26.5	4
Duck Lake	39.0	5
Home Camp	41.6	27
Selic-Alaska Canyon	32.7	3
Tuledad	37.7	27
Bicondoa	35.4	5

[1] Number of stands sampled.

No statistically significant differences between means exist ($p < 0.50$) Condition ratings used were for only those habitat types described as range sites by Summerfield and Bagley (1974). From APPENDIX F.

[2] Condition ratings are limited to systematic grazing allotments and the Bicondoa Allotment since vegetative sampling was not conducted on custodial management areas. Custodial allotments include 4,860 acres of public land, less than 1 percent of the study area.

TABLE 2-6
RANGE TREND BY ALLOTMENT

Allotment	Trend[1]	Probability of Trend[2]	Sample Size n[3]
Denio	up	$p < 0.50$	3
Wall Canyon	up	$p < 0.50$	1
Bare	up	$p < 0.50$	4
Home Camp	up	0.80 $p > 0.50$	6
Tuledad	down	$p < 0.50$	2
All Data Pooled	up	$0.90 > p > 0.80$	16

1/ Determined by Parker-3-Step Transects on those allotments where previous transects had been established.

2/ Probability of trend (p) determined by the Kolmogorov-Smirnov test for goodness of fit. No trends are significant at the $\alpha = 0.10$ level.

3/ Number of stands sampled.

Source: APPENDIX F.

TABLE 2-7

APPARENT TREND OF HABITAT TYPES DESCRIBED AS RANGE SITES BY SUMMERFIELD AND BAGLEY (1974)

Habitat Type	Apparent Trend[1]	Probability of Trend[2]	Sample Size n[3]
HT-1	down	$p < 0.50$	4
HT-2	up	$p < 0.50$	4
HT-3	up	$0.95 > p > 0.90$	3
HT-4	down	$p < 0.50$	3
HT-5	up[5]	$0.99 > p > 0.98$	8
HT-6	up	$0.80 > p > 0.50$	7
HT-7	up	$p < 0.50$	6
HT-9	Static [4]	$p < 0.50$	2
HT-10	up	$p < 0.50$	3
HT-11	down	$p < 0.50$	5
HT-12	down[5]	$0.998 > p > 0.995$	6
HT-14	up	$p < 0.50$	3
HT-15	up	$p < 0.50$	4
HT-16	down	$p < 0.50$	3
HT-17	up[5]	$0.98 > p > 0.95$	6
HT-18	up	$p < 0.95$	3
HT-19	up	$0.80 > p > 0.50$	4
HT-20	up[5]	$0.99 > p > 0.98$	8
HT-21	up	$p < 0.50$	5
HT-24	down	$0.80 > p > 0.50$	2
Pooled for all habitat types (excluding HT-5, 12, 17, 20)	up[5]	$p > 0.999$	61

[1] Determined by shrub form and age classes.

[2] Probability of trend (p) determined by the Kolmogorov-Smirnov test for goodness of fit.

[3] Number of stands sampled.

[4] Trend appears equally up or down. Probability expressed is the probability of the null hypothesis (i.e., no trend).

[5] Apparent trends significant at the $\alpha = 0.05$ level.

Source: APPENDIX F.

TABLE 2-8
APPARENT TREND OF ALLOTMENTS

Allotment[6]	Apparent Trend[1]	Probability of Trend[2]	Sample Size n[3]
Denio	Static[5]	$p > 0.50$	2
Lower Lake	up	$0.80 > p > 0.50$	4
Bare	up	$p < 0.50$	18
Lower Lake	up	$0.80 > p > 0.50$	4
Duck Lake	up	$p < 0.50$	6
Home Camp	up [4]	$p > 0.999$	17
Selic-Alaska Canyon	Static[5]	$p > 0.50$	4
Tuledad	up	$0.80 > p > 0.50$	20
Bicondoa	down	$p < 0.50$	5
Total (excluding Home Camp)	up	$0.99 > p > 0.98$	66

1/ Determined by shrub form and age classes.

2/ Probability of trend (p) determined by Kolmogorov-Smirnov test for goodness of fit.

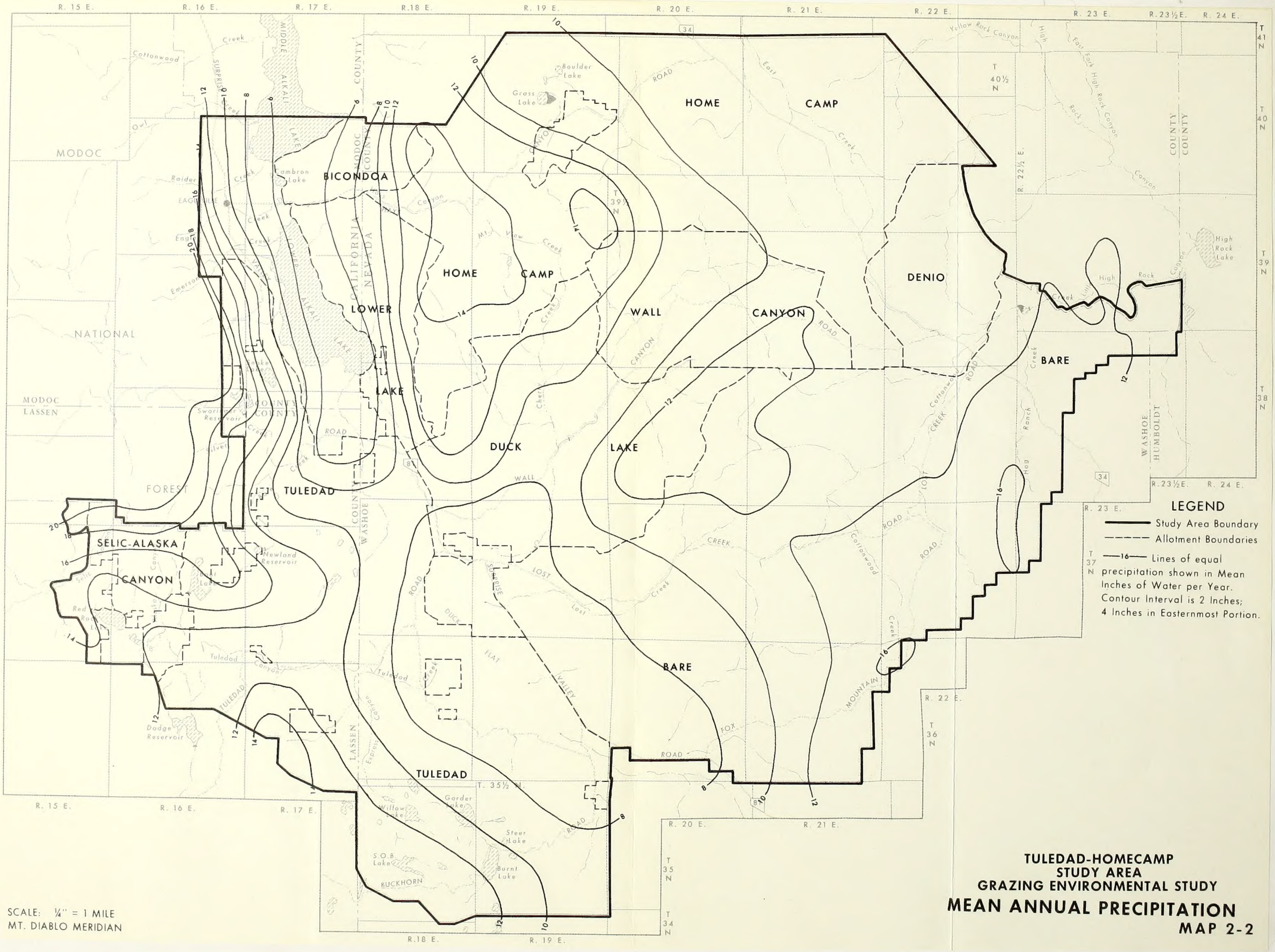
3/ Number of stands sampled.

4/ Apparent trends significant at the $\alpha = 0.05$ level.

5/ Trend appears equally up or down. Probability expressed is the probability of the null hypothesis (i.e., no trend).

6/ Apparent trend is limited to systematic grazing allotments and the Bicondoa Allotment since vegetative sampling was not conducted on custodial management areas. Custodial allotments include 4,860 acres of public land, less than 1 percent of the study area.

Source: APPENDIX F.



TULEDAD-HOMECAMP
STUDY AREA
GRAZING ENVIRONMENTAL STUDY

MEAN ANNUAL PRECIPITATION

MAP 2-2

Heavy rainfall of less than three hours' duration is usually associated with thundershowers in late spring and summer. Heavy rainfall of long duration is most often associated with winter storms.

Total annual snowfall ranges from 40 inches at the lower elevations to 70 inches in the mountains.

The monthly distribution of precipitation for Cedarville, 12 miles northwest of the study area, is shown in TABLE 2-9.

Temperature

The average daily high temperatures in July are usually in the 80's and nighttime lows are in the mid 40's. Extreme maximum temperatures occasionally reach 110° F. In January, the average daily highs are in the mid 30's and nighttime lows drop to 12° F to 19° F. Extreme minimum temperatures occasionally drop to −30° F. Average temperatures normally decrease with an increase in elevation. There are approximately 165-215 frost-free days between late May and late September.

Relative Humidity

During the winter season relative humidity percentages are high. Averages in January are about 65 percent. In the summer, the relative humidity ranges from 15 to 20 percent during the day to 30 percent at night. Dry northerly or easterly winds occasionally cause the humidity to drop below 10 percent.

Air Movement

Prevailing winds are westerly with wind speeds generally less than 15 miles per hour. The higher elevations experience greater air movements while the lower elevations, particularly in the enclosed Surprise Valley basin, are well protected. The enclosed basins of the region occasionally experience stagnant air conditions.

AIR QUALITY

There are no air quality monitoring stations within the Tuledad/Home Camp Study Area. The nearest data source is an air-quality monitoring station in Cedarville, 10 miles northwest of the study area. Air samples taken show levels of particulate matter rarely exceeding California standards (100 micrograms per cubic meter per 24-hour period). The ambient air quality is excellent. The area is far removed from industrial centers thereby reducing pollutants ordinarily associated with urban industrial centers.

SOILS

Forty-five individual soil series, plus numerous phases of these series (i.e., depth, slope, stony, etc.), are identified on 642,111 acres in the entire Tuledad/Home Camp Study Area. An additional 83,687 acres are mapped as Miscellaneous Land Types (Rubbleland and Badlands). MAP 2-3 shows the extent and geographical location of each soil.

The source of the soil map and interpretive data is the Soil Survey of the Surprise Valley—Home Camp Area, California—Nevada (Summerfield and Bagley, 1974), conducted by the Soil Conservation Service (SCS) cooperatively with the Forest Service, BLM, University of California Agricultural Experiment Station, and the University of Nevada Agricultural Experiment Station.

Where possible, individual soil series and phases of series were identified and delineated separately as associations.

Existing data were reassembled by habitat type (see Vegetation, above). Habitat types will be referred to by number only with references to TABLE 2-1.

Characteristics and qualities of soils are shown by habitat type in TABLE 2-10. Detailed descriptions of soil taxonomic units and soil map units have not been included.

Depth

Depth of soils in the study area ranges from 6 inches (0.5 feet) in HT-14 (Mosquet series) to greater than 60 inches (5 feet) in HT-2, 3, 4, 5, 6, 10, 11, 12, 13, 23, and 27 (numerous series).

Habitat Type 7, which makes up 22 percent of the area, contains soils that are deep.

Habitat Types 20 and 21, which constitute 27 percent of the area, contain mostly shallow soils.

Twenty percent of the habitat types contain soils that are very deep.

Seasonal High Water Table

Seasonal high water tables vary from seasonally ponded (surface water) in HT-3 and 27 (Boulder Lake Clay and Cummings Muck, clay subsoil variant) to none in soils of HT-4, 7, 8, 9, 11, 12, 14, 15, 16, 17, 18, 19, 21, 24, and 28 (numerous series). Most of the habitat types have soils with no seasonal water tables.

Slope

Slope gradient in soils of the study area ranges from nearly level (0-2 percent) in HT-1, 2, 3, 10,

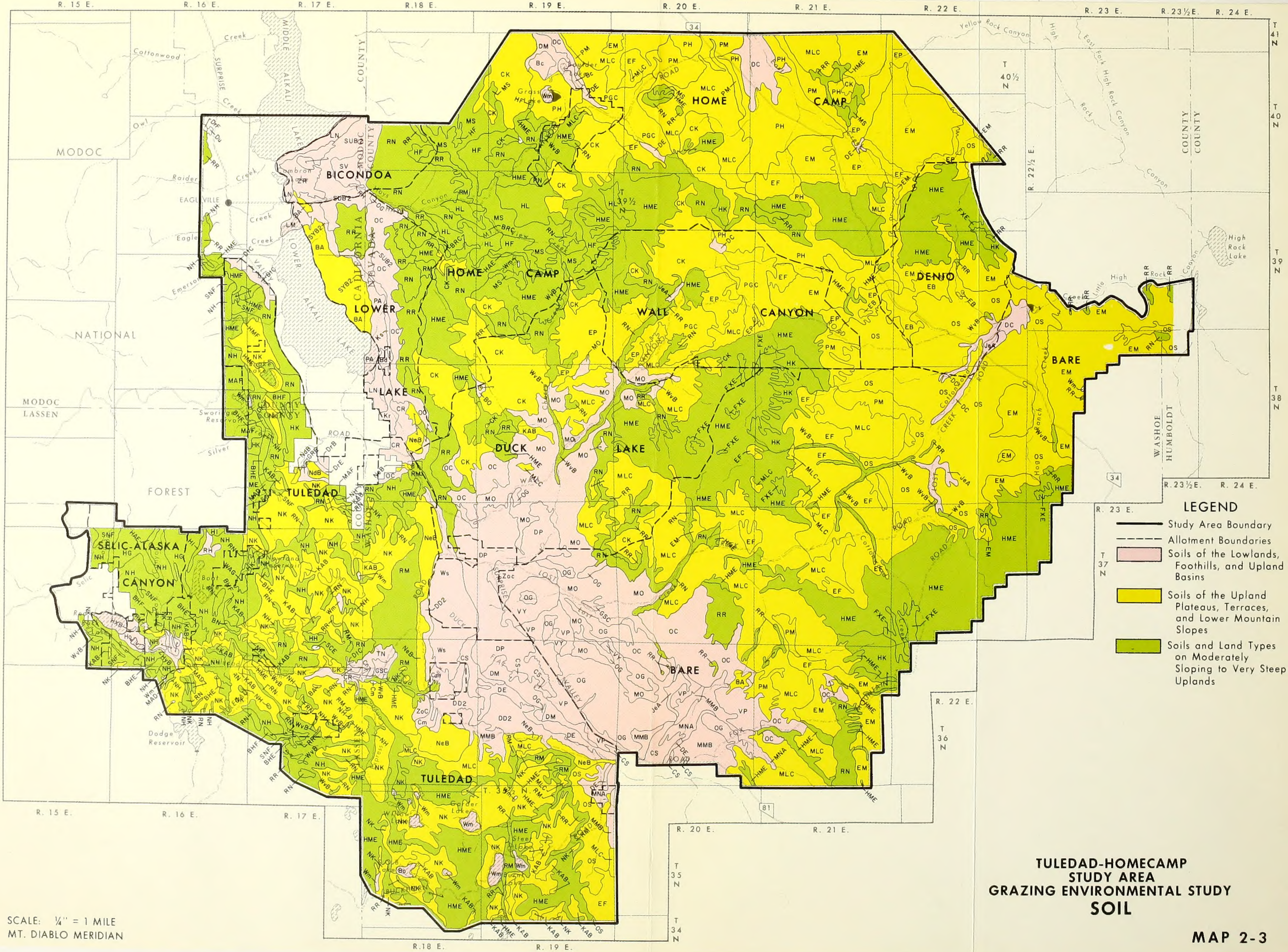
TABLE 2-9

NORMAL MONTHLY PRECIPITATION FOR CEDARVILLE, CALIFORNIA[1/]

Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1.80	1.49	1.42	.98	1.03	.89	.30	.16	.45	1.13	1.45	1.74

[1/] Inches of water averaged from 1951-1975 figures.

Source: Annual Summaries of Climatological Data for California, U.S. Department of Commerce, 1951-1975.



TULEDAD-HOMECAMP
STUDY AREA
GRAZING ENVIRONMENTAL STUDY
SOIL

SCALE: ¼" = 1 MILE
MT. DIABLO MERIDIAN

MAP 2-3

TABLE 2-10

CHARACTERISTICS AND QUALITIES OF SOILS BY HABITAT TYPE

Soil	Symbol	Depth to Hardpan or Bedrock (Feet)	Seasonal High Water Table (Feet)	Percent Slope	Erosion Hazard	Shrink-swell Potential	Frost Heave Potential	Rate of Runoff	Permeability of Surface Soil (in. per hr.)	Available Water Capacity (in. per in.)	Hydrologic Group
Habitat Type-1, Adobe Tableland											
Karlo clay	KAB	2-3	-	Nearly level	Slight	High	Moderate	Slow	0.06 - 0.20	0.14 - 0.16	D
Habitat Type-2, Alkali Flat											
Couch loam	Cm	**>5	6-7	Nearly level	Slight	Low	High	Slow	0.6 - 2.0	0.15 - 0.16	C
Couch loamy clay	*ZR	>5	6-7	0 - 15	Slight	Low	High	Slow	.06 - 0.2	0.15 - 0.16	C
Couch loamy clay	Cn	>5	6-7	Nearly level	Slight	Low	High	Slow	0.6 - 2.0	0.15 - 0.16	C
Crutcher very fine sandy loam	CR	>5	-	Nearly level	Slight	Moderate	High	Flooding	0.2 - 2.0	0.16 - 0.17	D
Crutcher silty clay loam	CS	>5	-	Nearly level	Slight	Moderate	High	Flooding	0.2 - 2.0	0.16 - 0.17	D
Dangberg loam	DbD	1.2-2.3	1.5-3	2 - 5		Moderate	High	Slow	0.6 - 2.0	0.16 - 0.17	D
Disabel silty clay loam	*DD2	>5	-	Nearly level	Slight	High	Moderate	Slow	0.06 - 0.2	0.15 - 0.17	D
Crutcher silty caly loam	*DD2	>5	-	Nearly level	Slight	Moderate	High	Slow	0.2 - 2.0	0.16 - 0.17	D
Disabel silty clay loam	*DP	>5	-	0 - 5	Slight	High	Moderate	Slow	0.06 - 0.2	0.15 - 0.17	D
Jesse Camp fine sandy loam	JcA	>5	-	0 - 2	Slight	Moderate	High	Medium	0.6 - 2.0	0.17 - 0.18	C
Jesse Camp silt loam	JeB	>5	-	2 - 5	Slight	Moderate	High	Slow	0.6 - 2.0	0.17 - 0.18	C
Lolak loamy sand, overflow	LK	>5	4-5	Nearly level	Severe	Low	Moderate	Flooding	- 0.06	0.16 - 0.17	C
Survya fine sandy loam	SYB2	>5	-	0 - 9	Moderate	Low	High	Medium	2.0 - 6.3	0.14 - 0.15	C

* Soils mapped as an association.

\>Greater than.

<Less than.

TABLE 2-10 (Continued)
CHARACTERISTICS AND QUALITIES OF SOILS BY HABITAT TYPE

Soil	Symbol	Depth to Hardpan or Bedrock (Feet)	Seasonal High Water Table (Feet)	Percent Slope	Erosion Hazard	Shrink-swell Potential	Frost Heave Potential	Rate of Runoff	Permeability of Surface Soil (in. per hr.)	Available Water Capacity (in. per in.)	Hydrologic Group
Habitat Type-3, Clay Basins											
Boulder Lake Clay	BO	>5	Seasonally Ponded	Nearly Level	Slight	High	Moderate	Flooding	0.06	0.14 - 0.15	D
Weimer clay, drained	Wp	>5	0 - 3	Nearly Level	None	High	Moderate	Flooding	0.06	0.14 - 0.16	D
Habitat Type-4, Desert Loam											
Raglan very fine sandy loam	RAB	>5	-	2 - 9	Slight	Moderate	High	Slow	2.0 - 6.3	0.14 - 0.16	D
Survya fine sandy loam	SUB2	>5	-	0 - 9	Moderate	Low	High	Medium	2.0 - 6.3	0.14 - 0.15	C
Survya fine sandy loam	*SV	>5	-	0 - 9	Moderate	Low	High	Medium	2.0 - 6.3	0.14 - 0.15	C
Habitat Type-5, Droughty Flood Plain											
Disabel silty clay loam	DC	>5	-	Nearly level	Slight	High	Moderate	Slow	0.06 - 2.0	0.15 - 0.17	D
Jesse Camp silt loam	*DE	>5	-	0 - 2	Slight	Moderate	High	Flooding	0.6 - 2.0	0.17 - 0.18	C
Crutcher silt loam	*DE	>5	-	0 - 2	Slight	Moderate	High	Flooding	0.6 - 2.0	0.16 - 0.17	D
Disabel silty clay loam	*DM	>5	-	0 - 5	Slight	Moderate	High	Slow	0.06 - 0.2	0.17 - 0.18	D
Jesse Camp silt loam, overwash	JEA	>5	Subject to Flooding	0 - 2	Slight	Moderate	High	Flooding	0.6 - 2.0	0.17 - 0.18	C
McConnel sandy loam, overwash	MNA	>5	Subject to Flooding	0 - 2	Slight	Moderate	High	Flooding	2.0 - 6.3	0.15 - 0.17	***C

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\>Greater than.
<Less than.

*** Shown as Hydrologic Group B in SCS Soil Survey Report (Summerfield and Bagley, 1974). Appears to be misplaced should be in Hydrologic Group C.

TABLE 2-10 (continued)
CHARACTERISTICS AND QUALITIES OF SOILS BY HABITAT TYPE

Soil	Symbol	Depth to Hardpan or Bedrock (Feet)	Seasonal High Water Table (Feet)	Percent Slope	Erosion Hazard	Shrink-swell Potential	Frost Heave Potential	Rate of Runoff	Permeability of Surface Soil (in. per hr.)	Available Water Capacity (in. per in.)	Hydrologic Group
Habitat Type-6, Droughty Loam											
Gorzell stony loam	GRE	> 5	-	5 - 30	Moderate	Moderate	High	Rapid Medium	0.6 - 2.0	0.15 - 0.16	B
Gorzell gravelly loam	GSC	> 5	-	2 - 15	Moderate	Moderate	High	Medium	0.6 - 2.0	0.15 - 0.16	B
Nevador loamy fine sane	NdB	> 5	-	2 - 5	Moderate	Low	High	Slow	2.0 - 6.3	0.15 - 0.15	C
Nevador fine sandy loam	NeA	> 5	-	0 - 2	Slight	Low	High	Slow	2.0 - 6.3	0.15 - 0.15	C
Nevador fine sandy loam	NeB	> 5	-	2 - 5	Moderate	Low	High	Medium	2.0 - 6.3	0.14 - 0.15	C
Old Camp extremely stony loam	*OC	< 1	-	5 - 15	Slight	Moderate	High	Medium	0.6 0 2.0	0.12 - 0.14	D
Old Camp very rocky loam	*OC	< 1	-	5 - 15	Slight	Moderate	High	Medium	0.6 - 2.0	0.12 - 0.14	D
Old Camp gravelly loam	*OG	< 1	-	5 - 15	Moderate	Moderate	High	Slow	0.6 - 2.0	0.12 - 0.14	D
Langston sandy loam	*OG	> 5	-	5 - 15	Moderate	Low	Moderate	Slow	2.0 - 6.3	0.12 - 0.13	C
Olson fine sandy loam	*OS	1 - 2	-	0 - 15	Moderate	Low	High	Rapid	2.0 - 6.3	0.12 - 0.13	D
Badland	*OS	< 1	-	-	-	-	-	-	-	-	
Vylach fine sandy loam	*VY	< 2	Subject to Flooding	0 - 5	Slight	Moderate	High	Rapid	2.0 - 6.3	0.14 - 0.16	D
Pegler fine sandy loam	*VY	< 2	Subject to Flooding	0 - 5	Slight	Moderate	High	Rapid	2.0 - 6.3	0.13 - 0.15	D

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< Less than.

TABLE 2-10 (continued)
CHARACTERISTICS AND QUALITIES OF SOILS BY HABITAT TYPE

Soil	Symbol	Depth to Hardpan or Bedrock (Feet)	Seasonal High Water Table (Feet)	Percent Slope	Erosion Hazard	Shrink-swell Potential	Frost Heave Potential	Rate of Runoff	Permeability of Surface Soil (in. per hr.)	Available Water Capacity (in. per in.)	Hydrologic Group
Habitat Type-7, Mountain Loam											
Hapgood very stony sandy loam	*BHE	>3.3	-	5 - 30	Moderate	Moderate	High	Rapid	0.6 - 2.0	0.14 - 0.16	B
Hapgood very stony sandy loam	*BHF	>3.3	-	30 - 50	Severe	Moderate	High	Rapid	0.6 - 2.0	0.14 - 0.16	B
Hapgood very stony fine sandy loam	HDG	>3.3	-	50 - 75	Severe	Moderate	High	Rapid	0.6 - 2.0	0.14 - 0.16	B
Hapgood stony fine sandy loam	*HF	>3.3	-	5 - 30	Moderate	Moderate	High	Medium	0.6 - 2.0	0.14 - 0.16	B
Home Camp stony loam	*HF	>3.3	-	5 - 30	Moderate	Moderate	High	Medium	0.6 - 2.0	0.15 - 0.16	C
Hapgood stony fine sandy loam	*HG	>3.3	-	5 - 30	Moderate	Moderate	High	Medium	0.6 - 2.0	0.14 - 0.16	B
Hapgood very stony find sandy loam	*HH	>3.3	-	30 - 50	Severe	Moderate	High	Rapid	0.6 - 2.0	0.14 - 0.16	B
Newlands very stony loam	*HH	>3.3	-	30 - 50	Severe	Moderate	High	Rapid	0.6 - 2.0	0.16 - 0.17	B
Hapgood very stony sandy loam	*HI	>3.3	-	5 - 30	Moderate	Moderate	High	Rapid	0.6 - 2.0	0.14 - 0.16	B
Newlands very stony loam	*HI	>3.3	-	5 - 30	Moderate	Moderate	High	Rapid	0.6 - 2.0	0.16 - 0.17	B
Hapgood stony fine sandy loam	*HK	>3.3	-	15 - 30	Moderate	Moderate	High	Rapid	0.6 - 2.0	0.16 - 0.17	B
Home Camp stony loam	*HME	3.3	-	5 - 30	Moderate	Moderate	High	Rapid	0.6 - 2.0	0.15 - 0.16	C
Newlands stony loam	*HME	2.3 - 5	-	5 - 30	Moderate	Moderate	High	Rapid	0.2 - 2.0	0.16 - 0.17	B

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< Less than.

TABLE 2-10 (continued)
CHARACTERISTICS AND QUALITIES OF SOILS BY HABITAT TYPE

Soil	Symbol	Depth to Hardpan or Bedrock (Feet)	Seasonal High Water Table (Feet)	Percent Slope	Erosion Hazard	Shrink-swell Potential	Frost Heave Potential	Rate of Runoff	Permeability of Surface Soil (in. per hr.)	Available Water Capacity (in. per in.)	Hydrologic Group
Home Camp very stony loam (Steep)	*HMF	>3.3	-	30 - 50	Severe	Moderate	High	Rapid	0.6 - 2.0	0.15 - 0.16	C
Newlands very stony loam	*HMF	2.3 - 5	-	30 - 50	Severe	Moderate	High	Rapid	0.6 - 2.0	0.16 - 0.17	B
Home Camp stony loam	*MS	>3.3	-	5 - 30	Moderate	Moderate	High	Rapid	0.6 - 2.0	0.15 - 0.16	C
Newlands stony loam	*NH	2.3 - 5	-	5 - 30	Moderate	Moderate	High	Rapid	0.6 - 2.0	0.16 - 0.17	B
Hapgood stony fine sandy loam	*NH	>3.3	-	5 - 30	Moderate	Moderate	High	Rapid	0.6 - 2.0	0.16 - 0.17	B
Hapgood stony fine sandy loam	*WD	>3.3	-	5 - 30	Moderate	Moderate	High	Rapid	0.6 - 2.0	0.16 - 0.17	B
Habitat Type-8, Mountain Ridges											
Breagar rocky loam	BRC	<1.0	-	2 - 15	Severe	Low	High	Medium	2.0 - 6.3	0.06 - 0.08	D
Habitat Type-9, Loamy Bottoms											
Disabel silty clay loam	*DE	>5	-	- - 2	Slight	Low	High	Rapid	0.2 - 0.6	0.17 - 0.18	D
Habitat Type-10, Saline Bottoms											
Bicondoa silty clay	*Bd	>5	1 - 3	Nearly level	Slight	High	Moderate	Very slow	0.06 - 0.2	0.15 - 0.17	C
Kissring fine sandy loam	*Bd	>5	1 - 3	Nearly level	Slight	Moderate	Moderate	Medium	0.6 - 2.0	0.14 - 0.16	D
Dangberg loam	DaA	<3	1 - 3	0 - 2	Moderate	Moderate	High	Medium	0.6 - 2.0	0.16 - 0.17	D
Hussa loam	*HvA	>5	2 - 4	0 - 2	Moderate	Moderate	High	Medium	0.6 - 2.0	0.17 - 0.18	D
Hussa clay loam	*Hz	>5	2 - 4	0 - 2	Slight	Moderate	High	Slow	0.6 - 2.0	0.17 - 0.18	D
Kissring fine sandy loam	Kr	>5	3 - 5	Nearly level	Slight	Low	High	Medium	0.6 - 2.0	0.14 - 0.16	D
Lolak silty clay	Lm	>5	4 - 5	Nearly level	Slight	High	Moderate	Very slow	0.06	0.16 - 0.17	C
Lolak silty clay	*LN	>5	4 - 5	Nearly level	Slight	High	Moderate	Slow	0.06	0.16 - 0.17	C

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TABLE 2-10 (continued)
CHARACTERISTICS AND QUALITIES OF SOILS BY HABITAT TYPE

Soil	Symbol	Depth to Hardpan or Bedrock (Feet)	Seasonal High Water Table (Feet)	Percent Slope	Erosion Hazard	Shrink-swell Potential	Frost Heave Potential	Rate of Runoff	Permeability of Surface Soil (in. per hr.)	Available Water Capacity (in. per in.)	Hydrologic Group
Habitat Type-11, Deep Sands											
Zorravista fine sand	*LN	>5	-	0 - 15	Severe	Low	Moderate	Very slow	20.0	0.06 - 0.07	A
Zorravista fine sand	*SV	>5	-	0 - 15	Severe	Low	Moderate	Very slow	20.0	0.06 - 0.07	A
Zorravista fine sand	ZoC	>5	-	0 - 15	Severe	Low	Moderate	Very slow	20.0	0.06 - 0.07	A
Zorravista fine sand	ZR	>5	-	0 - 15	Severe	Low	Moderate	Very slow	20.0	0.06 - 0.07	A
Habitat Type-12, Semidesert Loam											
McConnel sandy loam	*DM	>5	-	0 - 5	Moderate	Moderate	High	Medium	2.0 - 6.0	0.15 - 0.17	B
Pegler fine sandy loam	*DP	<2	-	0 - 5	Moderate	Moderate	High	Rapid	2.0 - 6.3	0.13 - 0.15	D
McConnel sandy loam	MMB	>5	-	0 - 5	Slight to Moderate	Moderate	High	Medium	2.0 - 6.0	0.15 - 0.17	B
McConnel sandy loam	*MO	>5	-	0 - 5	Slight to Moderate	Moderate	High	Medium	2.0 - 6.0	0.15 - 0.17	B
Badlands	*MO	(No range site)			-	-	-	-	-	-	D
Vylach fine sandy loam	*VP	<2	-	0 - 5	Slight	Moderate	High	Slow	2.0 - 6.3	0.14 - 0.16	D
Pegler fine sandy loam	*VP	>5	-	0 - 5	Slight	Moderate	High	Slow	2.0 - 6.3	0.14 - 0.15	D

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TABLE 2-10 (continued)
CHARACTERISTICS AND QUALITIES OF SOILS BY HABITAT TYPE

Soil	Symbol	Depth to Hardpan or Bedrock (Feet)	Seasonal High Water Table (Feet)	Percent Slope	Erosion Hazard	Shrink-swell Potential	Frost Heave Potential	Rate of Runoff	Permeability of Surface Soil (in. per hr.)	Available Water Capacity (in. per in.)	Hydrologic Group
Habitat Type-13, Semiwet Meadows											
Buntingville loam	BuB	>5	3 - 4	2 - 5	Moderate	Moderate	High	Slow	0.6 - 2.0	0.16 - 0.17	C
Campone gravelly loam	CAC	>5	3 - 5	2 - 15	Severe	Moderate	High	Medium	0.6 - 2.0	0.15 - 0.16	C
Campone clay loam	CCB	>5	3 - 5	0 - 5	Severe	Moderate	High	Medium	0.6 - 2.0	0.15 - 0.16	C
Hussa loam	HvA	>5	2 - 4	0 - 2	Slight	Moderate	High	Slow	0.6 - 2.0	0.16 - 0.18	D
Hussa loam	HvB	>5	2 - 4	2 - 5	Slight	Moderate	High	Slow	0.6 - 2.0	0.17 - 0.18	D
Hussa clay loam	HvA	>5	2 - 4	0 - 2	Slight	Moderate	High	Slow	0.6 - 2.0	0.17 - 0.18	D
Welch silty clay loam	WvB	>5	1.5 - 3	0 - 9	Slight	Moderate	High	Very slow	0.2 - 0.6	0.18 - 0.20	C
Habitat Type-14, Shallow Mountain Slopes											
Mosquet very stony fine sandy loam	*MS	0.5 - 2	-	5 - 30	Moderate	Moderate	High	Medium	0.6 - 2.0	0.14 - 0.15	D
Mosquet very stony fine sandy loam	*EM	0.5 - 2	-	5 - 30	Moderate	Moderate	High	Medium	0.6 - 2.0	0.14 - 0.15	D
Mosquet very stony fine sandy loam	*HK	0.5 - 2	-	15 - 30	Moderate	Moderate	High	Medium	0.6 - 2.0	0.14 - 0.15	D
Habitat Type-15, Stony Uplands											
Madeline very stony loam	MAD	9.8 - 1.7	-	2 - 30	Moderate	Moderate	High	Medium	0.6 - 2.0	0.16 - 0.17	D
Madeline very stony loam	MAF	0.8 - 1.7	-	20 - 50	Moderate	Moderate	High	Medium	0.6 - 2.0	0.16 - 0.17	D
Madeline very stony loam	*NK	0.8 - 1.7	-	2 - 30	Moderate	Moderate	High	Medium	0.6 - 2.0	0.16 - 0.17	D

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<Less than.

TABLE 2-10 (continued)
CHARACTERISTICS AND QUALITIES OF SOILS BY HABITAT TYPE

Soil	Symbol	Depth to Hardpan or Bedrock (Feet)	Seasonal High Water Table (Feet)	Percent Slope	Erosion Hazard	Shrink-swell Potential	Frost Heave Potential	Rate of Runoff	Permeability of Surface Soil (in. per hr.)	Available Water Capacity (in. per in.)	Hydrologic Group
Habitat Type-16, South Exposures											
Hartig gravelly loam	*HK	1.7 - 3.3	-	15 - 30	Moderate	Low	High	Medium	0.6 - 2.0	0.15 - 0.16	B
Habitat Type-17, Stony Claypan											
Catnip silt loam	*CK	1.7 - 3.3	-	0 - 9	Slight	Moderate	High	Medium	0.6 - 2.0	0.16 - 0.17	D
Ninemile extremely cobbly loam	*CK	0.8 - 1.7	-	0 - 9	Slight	Moderate	High	Medium	0.6 - 2.0	0.12 - 0.14	D
Ninemile extremely cobbly loam	*NK	0.8 - 1.7	-	0 - 9	Slight	Moderate	High	Slow	0.6 - 2.0	0.12 - 0.14	D
Toney extremely cobbly silt loam	*TN	1.7 - 3.3	-	0 - 9	Slight	Moderate	High	Medium	0.2 - 6.2	0.08 - 0.10	D
Ninemile extremely cobbly loam	*TN	0.8 - 1.7	-	0 - 9	Slight	Moderate	High	Medium	0.6 - 2.0	0.12 - 0.14	D
Habitat Type-18, Steep South Exposures											
Mendeboure very stony loam	*RN	1.7 - 3.3	-	30 - 50	Severe	Moderate	High	Rapid	0.6 - 2.0	0.15 - 0.16	C
Rubbleland	*RN	(Not in range site)		30 - 50 +	-	-	-	-	-	-	D
Habitat Type-19, Subalpine Slopes											
Snag stony fine sandy loam	*HG	3.3 - 5.0	-	5 - 30	Moderate	Low	High	Medium	2.0 - 6.3	0.14 - 0.15	B
Snag stony fine sandy loam	*HI	3.3 - 5.0	-	5 - 30	Moderate	Low	High	Medium	2.0 - 6.3	0.14 - 0.15	B
Snag stony fine sandy loam	*SrA	3.3 - 5.0	-	0 - 2	Moderate	Low	High	Medium	2.0 - 6.3	0.14 - 0.15	B
Snag stony fine sandy loam	*WE	3.3 - 5.0	-	20 - 50	Moderate	Low	High	Medium	2.0 - 6.3	0.14 - 0.15	B

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< Less than.

TABLE 2-10 (continued)
CHARACTERISTICS AND QUALITIES OF SOILS BY HABITAT TYPE

Soil	Symbol	Depth to Hardpan or Bedrock (Feet)	Seasonal High Water Table (Feet)	Percent Slope	Erosion Hazard	Shrink-swell Potential	Frost Heave Potential	Rate of Runoff	Permeability at Surface Soil (in. per hr.)	Available Water Capacity (in per in.)	Hydrologic Group
Habitat Type-20, Upland Loam (10-12' precip.)											
Four Star loam	Fo	> 5	2 - 3	Nearly level	Slight	Moderate	High	Slow	0.6 - 2.0	0.16 - 0.18	C
Mascamp extremely stony sandy loam	MLC	0.8 - 1.7	-	2 - 15	Slight	Low	High	Slow	2.0 - 6.3	0.08 - 0.11	D
Powley gravelly fine sandy loam	PGC	1.4 - 1.7	-	2 - 15	Moderate	Moderate	High	Medium	2.0 - 6.3	0.13 - 0.14	D
Powley gravelly fine sandy loam	*PH	1.4 - 1.7	-	2 - 15	Moderate	Moderate	High	Medium	2.0 - 6.3	0.13 - 0.14	D
Hartcamp fine sandy loam	*PH	0.8 - 1.7	-	2 - 15	Moderate	Low	High	Medium	0.6 - 2.0	0.14 - 0.16	D
Powley fine sandy loam	*PM	1.4 - 1.7	-	2 - 15	Moderate	Moderate	High	Medium	2.0 - 6.3	0.13 - 0.14	D
Mascamp very cobbly gravelly sandy loam	*PM	0.8 - 1.7	-	2 - 15	Slight	Low	High	Slow	2.0 - 6.3	0.08 - 0.11	D
Schamp stony clay loam	SCE	3.3 - 5.0	-	2 - 30	Moderate	Moderate	High	Medium	0.2 - 0.6	0.18 - 0.20	C
Habitat Type-21, Upland Pan											
Espil gravelly sandy loam	*EB	0.7 - 1.2	-	0 - 15	Slight	Low to Mod.	High	Slow	0.6 - 2.0	0.13 - 0.14	D
Badland	(Not in range site)		-	Steep	-	-	-	-	-	-	D
Espil gravelly sandy loam	*EF	0.7 - 1.2	-	0 - 15	Slight	Low to Mod.	High	Slow	0.6 - 2.0	0.13 - 0.14	D
Fertaline gravelly fine sandy loam	*EF	1.5 - 2.5	-	0 - 9	Slight	Low	High	Slow	0.6 - 2.0	0.13 - 0.15	D
Espil gravelly sandy loam	*EM	0.7 - 1.2	-	0 - 15	Slight	Low to Mod.	High	Slow	0.6 - 2.0	0.13 - 0.14	D
Espil gravelly sandy loam	*EP	0.7 - 1.2	-	0 - 15	Slight	Low to Mod	High	Slow	0.6 - 2.0	0.13 - 0.14	D
Espil gravelly sandy loam	*PH	0.7 - 1.2	-	0 - 15	Slight	Low to Mod.	High	Slow	0.6 - 2.0	0.13 - 0.14	D

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< Less than.

TABLE 2-10 (continued)
CHARACTERISTICS AND QUALITIES OF SOILS BY HABITAT TYPE

Soil	Symbol	Depth to Hardpan or Bedrock (Feet)	Seasonal High Water Table (Feet)	Percent Slope	Erosion Hazard	Shrink-swell Potential	Frost Heave Potential	Rate of Runoff	Permeability of Surface Soil (in. per hr.)	Available Water Capacity (in. per in.)	Hydrologic Group
Habitat Type-23, Wet Clay Basin											
Weimer clay	Wm	5	0 - 3	Nearly level	None	High	Moderate	Flooding	0.06	0.14 - 0.16	D
Weimer clay (alkaline)	Ws	5	0 - 3	Nearly level	None	High	Moderate	Flooding	0.06	0.14 - 0.16	D
Habitat Type-24, Juniper Savanah											
Home Camp stony loam	*RM	1.7 - 3.3	-	5 - 30	Moderate	Moderate	High	Medium	0.6 - 2.0	0.15 - 0.16	C
Rubbleland	*RM	(No range site)		30 - 60	Slight	-	-	High	-	-	D
Habitat Type-25, Upland Mahogany											
Bluebell very stony sandy loam	BHE	1.7 - 3.0	-	5 - 30	Slight-Severe	Moderate	High	Slow-Rapid	2.0 - 6.3	0.13 - 0.15	C
Bluebell very stony sandy loam	*BHF	1.7 - 3.0	-	30 - 50	None	Moderate	High	Medium	2.0 - 6.3	0.13 - 0.15	C
Foxmount gravelly loam	FXE	2.0 - 3.3	-	15 - 30	Slight	Moderate	Moderate	Slow	0.6 - 2.0	0.14 - 0.16	C
Habitat Type-26, Upland Aspen											
Hapgood fine sandy loam	HAE	3.3	-	5 - 30	Moderate	Moderate	High	Medium	0.6 - 2.0	0.14 - 0.16	B
Hapgood fine sandy loam	*HL	3.3	-	5 - 30	Moderate	Moderate	High	Medium	0.6 - 2.0	0.14 - 0.16	B
Habitat Type-27, Perennial Stream											
Cummings Muck, clay subsoil variant	CV	5	Seasonally Ponded	Nearly Level	Slight	Moderate	High	Very Slow	0.2 - 0.6	0.17 - 0.18	D
Cummings Muck, clay subsoil variant, drained	CW	5	1 - 2	Nearly Level	Slight	Moderate	High	Very Slow	0.2 - 0.6	0.17 - 0.18	D

* Soils mapped an an association. > Greater than. < Less than.

TABLE 2-10 (continued)
CHARACTERISTICS AND QUALITIES OF SOILS BY HABITAT TYPE

Soil	Symbol	Depth to Hardpan or Bedrock (Feet)	Seasonal High Water Table (Feet)	Percent Slope	Erosion Hazard	Shrink-swell Potential	Frost Heave Potential	Rate of Runoff	Permeability of Surface Soil (in. per hr.)	Available Water Capacity (in. per in.)	Hydrologic Group
Habitat Type-28, Upland Timber											
Tourn stony loam	TOC	1.7 - 3.3	-	2 - 15	Moderate	Low-Moderate	High	Slow	0.6 - 2.0	0.14 - 0.16	C
Waca stony fine sandy loam	WAE	1.7 - 3.3	-	5 - 30	Moderate	Low	High	Medium	2.0 - 6.3	0.06 - 0.15	C
Waca stony fine sandy loam	WAF	1.7 - 3.3	-	30 - 50	Severe	Low	High	Rapid	2.0 - 6.3	0.06 - 0.15	C
Waca stony fine sandy loam	WAG	1.7 - 3.3	-	50 - 75	Severe	Low	High	Rapid	2.0 - 6.3	0.06 - 0.15	C

* Soils Mapped as an association.

> Greater than.

< Less than.

23, and 27 (numerous series) to 75 percent in HT-7 and 28.

Twenty-nine percent of the habitat types have soils with slope gradients up to 15 percent. Sixty-three percent of the habitat types have soils with slope gradients up to 30 percent. Only 3 percent of the habitat types have soils with gradients up to 75 percent.

"Erosion Hazard-Rating" is based on the susceptibility of surface soil to erosion when no cover is present. Rate of soil displacement is influenced primarily by soil qualities, physical properties, rainfall intensity, and slope gradient. Six criteria are considered within each of the three classes:

Class	*Criteria*
Slight—(Minor sheet or rill erosion may occur. Little loss of surface soil.)	Potential erosion is not significant enough to reduce productivity. Soils: —Contain water-stable aggregates; —Have good infiltration and percolation rates; —Have adequate depth to store most of the normal precipitation; —Contain no restrictive layers; —Occur on gentle slopes.
Moderate—(Some loss of surface soil can be expected. Rills, small gullies, and sheet erosion may occur.)	Potential erosion is significant enough to reduce productivity but not to the point of entirely restricting production. Soils: —Contain aggregates that are not water stable; —They have moderate infiltration and percolation rates; —They have moderate depths to store only part of the normal precipitation; —They may contain restrictive layers; —They occur on moderate slopes.
Severe—(Considerable loss of surface soil can be expected. Rills, numerous gullies, and sheet erosion can occur.)	Potential erosion will cause a reduction in productivity to practically zero. Soils: —They contain very unstable aggregates; —They have slow infiltration and percolation rates; —They have little soil for water storage; —They contain restrictive layers; —They occur on steep slopes.

Erosion hazard by habitat type and allotment is shown in TABLE 2-11 and on MAP 2-4.

Analysis of data indicates that 29 percent of the habitat types or approximately 175,000 acres of the total area has soils with no or only slight erosion hazard in a bare-ground condition. Most of these soils are on those sites that are nearly level to gently sloping (HT-1, 3, 5, 9, 23, and 27). However, soils of HT-17 and 21 on slopes up to 15 percent also indicate only slight erosion hazard. These soils have adequate surface gravels and stones as pavement. The soils in HT-17 and 21 are phases of the Catnip, Nine Mile, Toney, Espil, and Fertaline series.

Thirty-four percent of the study area, approximately 200,000 acres, has soils with slight to moderate erosion hazard. Soils in this category are those of HT-4, 6, 10, 12, 20, and 24, and include phases of the Raglan, Survya, Gorgell, Nevador, Old Camp, Langston, Olson, Vylach, Pegler, Bicondoa, Kissring, Dandberg, Hussa, Lolak, McConnel, Four Star, Mascamp, Powley, Hart Camp, Schamp, and Home Camp series. Slopes in this category range up to 30 percent gradient.

Twenty-four percent of the study area, 145,000 acres, has soils with moderate to severe erosion hazard. Soils in this category are those of HT-7 and 28. They are phases of Hapgood, Home Camp, Newlands, Tourn, and Waca series. Slopes in this category range up to 50 percent gradient.

Six percent of the habitat types or approximately 34,000 acres have soils with moderate erosion hazard. Soils in this category are those of HT-14, 15, 16, 19, and 26. They are phases of the Mosquet, Madeline, Hartig, Snag, and Hapgood series. Slopes in this category range up to 50 percent gradient.

Three percent of the habitat types or approximately 15,000 acres have soils with severe erosion hazard. Soils in this category are those of HT-8, 11, and 18. They are phases of the Breagar, Zorravista, and Mendeboure series. Slopes in this category range up to 75 percent gradient.

The remaining 4 percent of the habitat types or approximately 25,000 acres have soils with slight to severe erosion hazard. Soils in this category are those of HT-2, 13, and 25. Soils are phases of the Couch, Crutcher, Dangberg, Disabel, Jesse Camp, Lolak, Survya, Buntingville, Campone, Hussa, Welch, Bluebell, and Foxmount series. Slopes in this category range up to 50 percent gradient.

Sediment Yield

Sediment yields in tons per acre per year were computed for each habitat type by the Pacific Southwest Interagency Committee (PSIAC) method (1968). In this system, nine factors are considered in arriving at a numerical rating that places a site in one of five classes of sediment yield:

		Sediment Yield	
Classification	*Rating*	*Acre Ft/Sq Mile*	*Tons Per Acre*
1	100	3.0	9.3
2	75–100	1.0–3.0	3.1–9.13
3	50–75	0.5–1.0	1.5–3.1
4	25–50	0.2–0.5	0.6–1.5
5	0–25	0.2	0.6

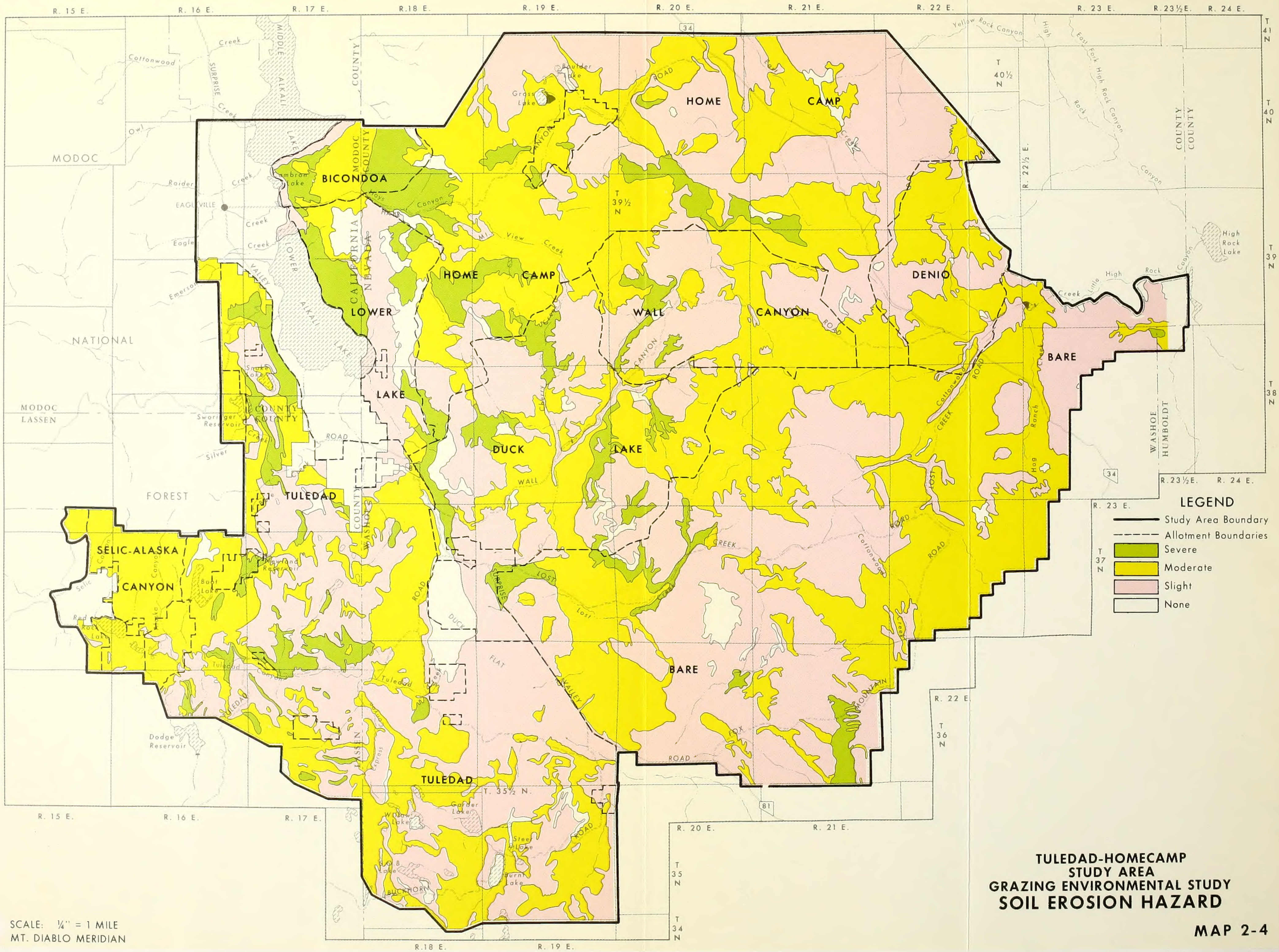
TABLE 2-11
EROSION HAZARD BY HABITAT TYPE AND ALLOTMENT

Systematic Grazing Management Allotments

Habitat Type	Erosion Hazard				Total Acres	% of Study Area	DUCK LAKE		DENIO		HOME CAMP		LOWER LAKE		TULEDAD		SELIC-ALASKA CANYON		BARE		WALL CANYON	
	Severe	Moderate	Slight	None			Acreage	% of Allot.	Acreage	% of Allot.	Acreage	% of Allot.	Acreage	% of Allot.	Acreage	% of Allot.	Acreage	% of Allot.	Acreage	% of Allot.	Acreage	% of Allot.
8, 11, 18					15,355	3	3,101	6	43	1	3,759	3	333	3	2,781	2	78	1	3,093	2	786	2
7, 28					145,235	24	11,157	22	5,987	29	27,470	19	558	5	42,848	29	4,991	60	40,784	23	10,102	30
2, 13, 25					24,754	4	2,276	5	137	1	295	1	413	4	16,232	11	425	5	4,146	2	206	1
14, 15, 16, 19, 26					34,046	6	342	1	952	5	8,694	6	186	2	14,132	10	2,738	33	6,301	4	636	2
4, 6, 10, 12,20,24					200,514	34	22,223	45	6,811	33	42,504	29	7,857	71	22,592	15	10	1	88,419	50	8,945	27
1, 5, 9, 17 21, 27					172,828	29	10,430	21	6,550	32	61,327	42	1,645	15	46,416	32	79	1	33,585	19	12,728	38
3					1,803	1	95	1	165	1	1,289	1	0	0	209	1	0	0	24	1	20	1
23					1,349	1	106	1	0	0	326	1	0	0	884	1	0	0	18	1	0	0
TOTAL					595,884	100	49,730	100	20,645	100	145,664	100	10,992	100	146,094	100	8,321	100	176,370	100	33,423	100

TABLE 2-11 (Continued)

	Erosion Hazard						Custodial Grazing Management Allotments															
							RED ROCK		COLD SPRINGS		CEDAR		BOOT LAKE		STATE LINE		CLARKS VALLEY		CORRAL		HIGHWAY	
Habitat Type	Severe	Moderate	Slight	None	Total Acres	% of Study Area	Acreage	% of Allot.	Acreage	% of Allot.	Acreage	% of Allot.	Acreage	% of Allot.	Acreage	% of Allot.	Acreage	% of Allot.	Acreage	% of Allot.	Acreage	% of Allot.
8, 11, 18	—				15,355	3	0	0	0	0	0	0	0	0	6	4	0	0	23	2	200	16
7, 28	—	—			145,235	24	696	80	93	43	160	96	246	63	0	0	24	80	125	8	0	0
2, 13, 25	—	—	—		24,754	4	80	9	10	5	6	4	143	37	0	0	6	20	4	1	275	22
14, 15, 16, 19, 26		—			34,046	6	35	4	41	19	0	0	0	0	0	0	0	0	28	2	0	0
4, 6, 10, 12, 20, 24		—	—		200,514	34	0	0	0	0	0	0	0	0	130	95	0	0	252	17	771	62
1, 5, 9, 17 21, 27			—		172,828	29	64	7	70	33	0	0	1	1	1	1	0	0	1,042	70	0	0
3			—	—	1,803	1	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0
23				—	1,349	1	0	0	0	0	0	0	0	0	0	0	0	0	15	1	0	0
TOTAL					595,884	100	875	100	166	100	390	100	390	100	137	100	30	100	1,490	100	1,246	100



TULEDAD-HOMECAMP
STUDY AREA
GRAZING ENVIRONMENTAL STUDY
SOIL EROSION HAZARD

MAP 2-4

LEGEND
— Study Area Boundary
- - - Allotment Boundaries
🟩 Severe
🟨 Moderate
▨ Slight
☐ None

SCALE: ¼" = 1 MILE
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Values derived are not absolute but are in the realm of probability and can be used to show soil movement relative to variability of the nine factors evaluated.

Approximately 60 percent of the habitat types have soils in sediment yield Class 4 as shown in TABLE 2-12 which is within the range projected for normal geologic erosion of the majority of Great Basin soils by the PSIAC subcommittee. With eight of the nine factors remaining constant for a site, the variability of vegetative density can be shown to affect sediment yield with this rating system.

Ground Cover by Vegetation and Litter

TABLE 2-13 shows the present ground condition by vegetative-litter cover. Thirty-two percent of the habitat types have soils with at least 60 percent cover.

Shrink-Swell Potential

Shrink-swell behavior refers to the volume change in a soil in relation to variation in moisture content. Volume change is influenced by the degree of moisture variation and the amount and kind of clay in the soil. Because of the extreme variability in seasonal moisture content and the characteristic cracking when dry (4-5 inches wide), relatively few plant species adapt to the physical stress on roots and root crowns to survive past germination.

Soils with a high shrink-swell potential are clays or silty clays usually occupying nearly level basin bottoms or mesas. Examples of such soils in the study area are: the Karlo clay series, which comprises all of HT-1 (20,338 acres); the Boulder Lake and Weimer clay series, which comprise all of HT-3 (1,855) acres; and the Weimer clays comprising all of HT-23 (2,307 acres). Smaller delineations of high clay content soils exhibiting the same characteristics are mapped as associations with contrasting soil series.

Frost-Heave Potential

Soils having surface textures of loam, silt loam, and sandy loam are most subject to heaving and reduced bulk density during spring thaws. Heaving tends to restore soils compacted by grazing animals to normal bulk densities. Despite conflicting results by others, studies conducted by Laycock and Conrad (1967) on loam and clay loam soils indicated no significant difference in grazed and ungrazed plots in bulk densities. The effects of freeze-thaw action are not analyzed in this study.

The majority of soils (over 90 percent of total acreage) in the Tuledad/Home Camp Study Area exhibit high frost-heave properties and the potential for restoring soils to normal surface bulk density.

Surface Runoff

Surface runoff refers to the relative rate water flows over the surface of the soil. The classes are defined as follows:

(1) Slow: surface water flows away so very slowly that free water covers the soil for a significant period or enters the soil rapidly. This category is subdivided into two additional classes, pond (flooding) and very slow.

(2) Medium: surface water flows away at such a rate that a moderate portion of the water enters the soil and free water lies on the surface for only a short period of time.

(3) Rapid: a large portion of the precipitation moves rapidly over the soil surface and only a small part moves through the soil.

RATE OF RUNOFF

Rates of surface runoff and accelerated erosion are largely a function of vegetative cover, including litter, and soil bulk density, although they are greatly influenced by soil texture, slope, and the protection provided by surface rock (Meeuwig, 1970a). Meeuwig found that an increase in bulk density of 20 percent doubled the soil eroded on fine-textured Great Basin soils. Also, erosion was three times greater on a 40-percent slope than at 18 percent slope gradient. These relationships have not been studied in the Tuledad/Home Camp Study Area. Habitat Type-7 in TABLE 2-1 and MAP 2-1, comprising 144,987 acres, best typifies the rapid runoff rating from steep slopes on relatively uniform loamy surface soils. These ratings are not quantified in terms of inches per hour since they must be related to specific intensities and durations of precipitation events and to slope, soil texture, and ground cover. Estimated annual water yields from hydrologic watersheds are included in the Water section of this chapter.

The relative rates of surface runoff by habitat type and allotment in the study area are displayed

TABLE 2-12
SOIL MOVEMENT BY HABITAT TYPE AND ALLOTMENT[1]

					ALLOTMENT							
Habitat Type No. [2]	Soil Name	PSIAC Class.	Tons/ ac./yr.	Inches/[3] ac./yr.	Duck Lake	Denio	Home Camp	Lower Lake	Tuledad	Selic-Alaska Canyon	Bare	Wall Canyon
HT- 1	Tableland	5	.53	.003	798.71		1,384.36	225.78	5,734.60		56.18	552.79
2	Alkali flat	3	1.71	.008	3,334.50		64.98	653.22	23,693.76		1,978.47	6.84
3	Clay basin	4	1.07	.006	101.65	175.55	1,379.23		223.63		25.68	21.40
4	Desert loam	4	1.34	.008	69.68		4.02	1,658.92				
5	Dry flood plain	4	0.97	.006	31.04	919.56	5,289.41	64.99	2,491.93		2,488.05	614.01
6	Droughty loam	3	1.75	.011	8,127.00	9,903.25	4,186.00	9,450.00	18,462.50		73,421.25	1,013.25
7	Upland loam	3	1.87	.011	20,865.46	11,251.79	51,555.90	1,043.46	78,921.48	9,032.10	76,971.07	18,946.85
8	Upland ridges	3	1.55	.009		23,25	1,622.85				254.20	
9	Loamy bottoms	4	0.80	.005		16.00	52.80		794.40		32.80	3.20
10	Saline bottoms	4	0.92	.006	9.20			793.96	2.76		6.44	60.72
11	Sand hills	2	3.60	.022	3,240.00			198.80	1,087.20		2,527.20	14.40
12	Semi-desert loam	4	1.19	.007	8,980.93		328.44		6,346.27		13,134.03	204.68
13	Semi-wet meadows	3	2.12	.013	1,738.40	118.72	298.92		1,570.92	167.48	2,291.72	36.04
14	Upland shallow loam	3	1.80	.011		1,247.40	12,817.80		9.00	9.00	7,992.00	864.00
15	Upland stony loam	3	1.55	.009	525.45		613.80	227.85	19,158.00	24.80	285.20	213.90
16	Upland gravelly loam	4	1.41	.008		335.58	705.00		1.41	15.51	2,337.78	
17	Upland claypan	4	0.75	.005	4,905.75		11,668.50	29,25	19,722.00		436.50	4,315.50
18	Upland south slopes	4	1.41	.008	3,111.87	39.48	3,826.74	1,624.32	3,492.57	109.98	3,156.99	1,115.31
19	Mtn. north slopes	4	1.34	.008			53.60		2,306.14	3,434.42		
20	Loamy 10-12" P.Z.	4	1.37	.008	13,228.72	1,652.22	52,542.24		3,275.60		48,591.16	11,190.16
21	Semi-desert claypan	4	0.91	.005	1,392.30	5,060.51	33,703.67		1,326.78		26,585.65	4,842.11
22	Upland fan											
23	Wet clay basin	5	0.50	.003	54.00		163.00		445.00		9.00	
24	Upland juniper	4	1.37	.008	345.24		530.19	109.60	5,474.52			
25	Upland mahogany	4	.62	.004	186.62	11.16			1,386.94	245.52	576.04	48.93
26	Upland aspen	4	.62	.004			395.56		46.50	88.66		
27	Perennial stream	No Data										
28	Upland timber	4	.62	.004					260.40	117.80		
	TOTAL				71,046.52	30,754.47	183,187.01	16,080.15	196,234.31	13,245.27	263,157.41	44,064.13

[1] In tons per year.

[2] Habitat type numbers conform to habitat in vegetation section.

[3] One acre foot of soil weighs 2,000 tons (approximately).

SOURCE: Adaption of Pacific Southwest Interagency Committee subcommittee report, 1968.

TABLE 2-12 (Continued)

Habitat Type No. 2/	Soil Name	PSIAC Class.	Tons/ ac./yr.	Inches/3/ ac./yr.	ALLOTMENT Red Rock	Cold Springs Mt.	Cedar	Boot Lake	State Line	Clarks Valley	Corral	Highway
HT- 1	Tableland	5	.53	.003	18.55	9.54			1.59		71.02	641.25
2	Alkali flat	3	1.71	.008							6.84	
3	Clay basin	4	1.07	.006							1.07	
4	Desert loam	4	1.34	.008								
5	Dry flood plain	4	0.97	.006							3.88	
6	Droughty loam	3	1.75	.011					19.25			694.75
7	Upland loam	3	1.87	.011	1,297.78	183.26	287.98	463.76		54.23	233.75	
8	Upland ridges	3	1.55	.009								
9	Loamy bottoms	4	0.80	.005							4.80	
10	Saline bottoms	4	0.92	.006					7.36			1.84
11	Sand hills	2	3.60	.022					21.60			720.00
12	Semi-desert loam	4	1.19	.007								442.68
13	Semi-wet meadows	3	2.12	.013		12.72					163.24	
14	Upland shallow loam	3	1.80	.011								
15	Upland stony loam	3	1.55	.009	24.80	27.90					6.20	
16	Upland gravelly loam	4	1.41	.008								
17	Upland claypan	4	0.75	.005	29.25	34.50		.75	.75		552.75	
18	Upland south slopes	4	1.41	.008							32.43	
19	Mtn. north slopes	4	1.34	.008	25.46	30.82						
20	Loamy 10-12" P.Z.	4	1.37	.008							345.24	
21	Semi-desert claypan	4	0.91	.005							77.44	
22	Upland fan											
23	Wet clay basin	5	0.50	.003							7.50	
24	Upland juniper	4	1.37	.008								
25	Upland mahogany	4	.62	.004	43.10	3.10	3.72	87.42		.62		
26	Upland aspen	4	.62	.004								
27	Perennial stream	No Data										
28	Upland timber	4	.62	.004								
	TOTAL				1,439.24	301.84	291.70	551.93	50.55	54.85	1,506.16	2,500.52

1/ In tons per year.

2/ Habitat type numbers conform to habitat in vegetation section.

3/ One acre foot of soil weighs 2,000 tons (approximately).

SOURCE: Adaption of Pacific Southwest Interagency Committee subcommittee report, 1968.

TABLE 2-13
HABITAT TYPE IN RELATION TO PRESENT COVER WITHIN STUDY AREA

Habitat Type Number	Acres of Habitat Type in Study Area	Percent of Total Study Area	Present Minimum Cover - 100% (Bareground + rock)	Now have 60% Cover (Acres)
HT- 4	1,293	0.5	17	
12	24,737	4.0	26	
2	17,776	3.0	30	
10	959	0.5	17	
8	1,126	0.5	No Data	
21	80,804	12.0	36	
14	12,744	1.0	43	
1	16,704	3.0	77	16,704
17	55,594	9.0	41	
11	2,447	0.5	22	
6	71,587	11.0	34	
5	12,271	2.0	62	12,271
20	95,493	15.0	40	
18	11,709	2.0	45	
16	2,412	0.5	28	
15	13,618	2.0	39	
24	4,715	1.0	47	
22	1,225	0.5	No Data	
7	144,979	22.0	60	144,979
19	4,336	1.0	69	4,336
9	1,130	0.5	44	
25	5,796	2.0	80	5,796
3	1,803	0.5	34	
23	1,375	0.5	42	
26	856	0.5	80	856
27			No Data	
13	3,018	0.5	54	
28	610	0.5	80	610
TOTAL	591,099			185,552

in TABLE 2-14 and MAP 2-5. Shown are the different capacities of soils to retain surface water. This is directly related to rate of infiltration or permeability of the surface soil.

Most of the soils have the capability to absorb water at greater rates than the average intensities of rainfall. The relationship between above-average rainfall intensities and soil-surface permeability is discussed in the Water section of this chapter.

Fifty-six percent of the habitat types have soils with medium or less rate of surface runoff.

Twenty-five percent of the habitat types have soils with medium to rapid rate of surface runoff.

Seventeen percent of the habitat types have soils with a slow to rapid runoff rate.

Only 2 percent of the habitat types have soils with rapid runoff. Soils in these habitat types (HT-9 and 18) are phases of the Disabel and Mendeboure series. Disabel soils occur in association with Jesse Camp soils on nearly level, broad, shallow drainage-ways and are subject to overwash. Mendeboure soils have very stony surfaces and occur on slopes of 30 to 50 percent gradient.

Permeability

The permeability of the surface soil as used here is the rate in inches per hour at which water passes through saturated soil and is roughly equivalent to infiltration rate. It is not to be confused with the generally accepted usage of the term "soil permeability."

The following classes and rates are used (BLM Manual 7312—Soils):

Permeability Class	*Numerical Range (in/hr)*
Very slow	0.06
Slow	0.06- 0.2
Moderately slow	0.2 - 0.6
Moderate	0.6 - 2.0
Moderately rapid	2.0 - 6.0
Rapid	6.0 -20.0
Very rapid	20.0

Soils with loamy surface textures are dominant in the study area, with 55 percent of the series and 68 percent of the area mapped having normal permeability rates of 0.6 to 2.0 inches per hour.

Available Water Capacity (AWC)

Available water capacity refers to the total quantity of water available for plant growth that is stored in the effective root zone or, for very deep soils, in the upper 60 inches of the soil profile at field capacity. It includes the moisture content in the root zone between the limits of permanent wilting point and field capacity. It is largely dependent upon effective soil depth, texture, and coarse-fragment content. Soil structure and organic-matter content have a minor influence on the available water capacity. In general, profiles that contain 50 percent coarse fragments (by volume) will only have half the available water capacity of a comparable soil that is free of coarse fragments. Average available water capacities for nongravelly textural classes (in inches of water per inch of soil) are: 0.06 for sand; 0.08 for loamy sand; 0.10 for sandy loam; 0.16 for loam; 0.18 for clay loam; 0.20 for silt loam and silty clay loam; and 0.18 for silty clay and clay. The classes of available water capacity for the entire effective root zone are:

Class	*AWC (in inches)*
Very high	12
High	9 to 12
Moderate	6 to 9
Low	3 to 6
Very low	0 to 3

The effectiveness of AWC depends on the surface permeability providing the moisture normally retained by subsurface soil horizons. Livestock grazing can affect this property by reducing the pore space between soil particles in the surface soil thus altering the permeability of the surface soil.

Soil Hydrologic Groupings

Soils have been divided into four hydrologic groups that indicate the general infiltration and water-movement characteristics of the soils. The four groups are defined as follows (BLM Manual 7312—Soils):

Group A: Soils having high infiltration rates even when thoroughly wetted, consisting chiefly of deep, well- to excessively drained sands and/or gravel. These soils have a high rate of water transmission and would result in a low runoff potential.

Group B: Soils having moderate infiltration rates when thoroughly wetted, consisting chiefly of moderately deep to deep, moderately well-to well-drained soils with moderately fine to moderately coarse textures. These soils have a moderate rate of water transmission.

Group C: Soils having slow infiltration rates when thoroughly wetted, consisting chiefly of (1) soils with a layer that impedes the downward movement of water or (2) soils with a moderately fine to fine texture and a slow infiltration rate. These soils have a slow rate of water transmission.

Group D: Soils having very slow infiltration rates when thoroughly wetted, consisting chiefly of (1) clay soils with high swelling potential, (2) soils with a high permanent water table, (3) soils with claypan or clay layer at or near the surface, and (4) shallow soils over nearly impervious materials. These soils have a very slow rate of water transmission.

Distribution of hydrologic groups by habitat type and allotment is shown in TABLE 2-15.

As TABLE 2-15 indicates, the majority of the soils in the study area fall in Hydrologic Groups B and C with slow to moderate rates of infiltration and water transmission. Examples of these soils include phases of the Karlo, Boulder Lake, Espil, Couch, Disabel, Home Camp and Newlands series. Only 2 percent of the study area has soils in Hydrologic Group A, with high rates of infiltration and water transmission and with low runoff potential.

WATER

Watershed Basins

There are 11 major watershed basins in the Tuledad/Home Camp Study Area (MAP 2-6 and TABLE 2-16).

Duck Lake watershed comprises 42 percent of the total area including the Duck Lake Allotment and portions of the Home Camp, Wall Canyon, Bare, and Tuledad Allotments. Major drainages are Wall, Cherry, Boardwell, Lost, and Tuledad Canyon Creeks. Surface and subsurface drainage is internal with final destination at Duck Flat. Wall Creek Reservoir, with a capacity of 400 acre-feet, is the major body of surface water and was constructed to irrigate private lands in Duck Flat.

Included in the Duck Lake watershed are approximately 28 square miles of enclosed basins without external drainage in the southwest segment. The major receptors for these individual basins are Burnt, SOB, Garden, Steer, and Willow Lakes. Ponding is temporary and seasonal.

Cottonwood watershed, 21 percent of the total area, is composed of portions of the Bare, Denio, Home Camp, and Wall Canyon Allotments. The main drainage is Cottonwood Creek, an ephemeral channel approximately 24 miles long with its terminus in High Rock Canyon, out of the study area. Several of the major tributaries such as Clover Creek and Hog Ranch Creek are perennially wet meadows with flowing streams. All others flow briefly during periods of high intensity rainfall.

Third in areal extent, 9 percent of the area, is the Bare Creek watershed on the west side of Surprise Valley with drainage out of the allotments into Surprise Valley. Major surface-water bodies are Sworinger and Newlands Reservoirs with 4,050 and 2,279 acre-feet of water, respectively; the water is used for irrigation of the Bare Ranch at the lower end of Surprise Valley.

Lower Lake watershed (east), occupying less than 9 percent of the total acreage, drains west into Lower Lake of Surprise Valley. Allotments within its boundaries include the east side of Lower Lake and portions of Bicondoa and Home Camp. Hayes Canyon Creek, draining into Lower Lake east of the town of Eagleville, is the major drainage flowing intermittently in portions of its 8-mile reach.

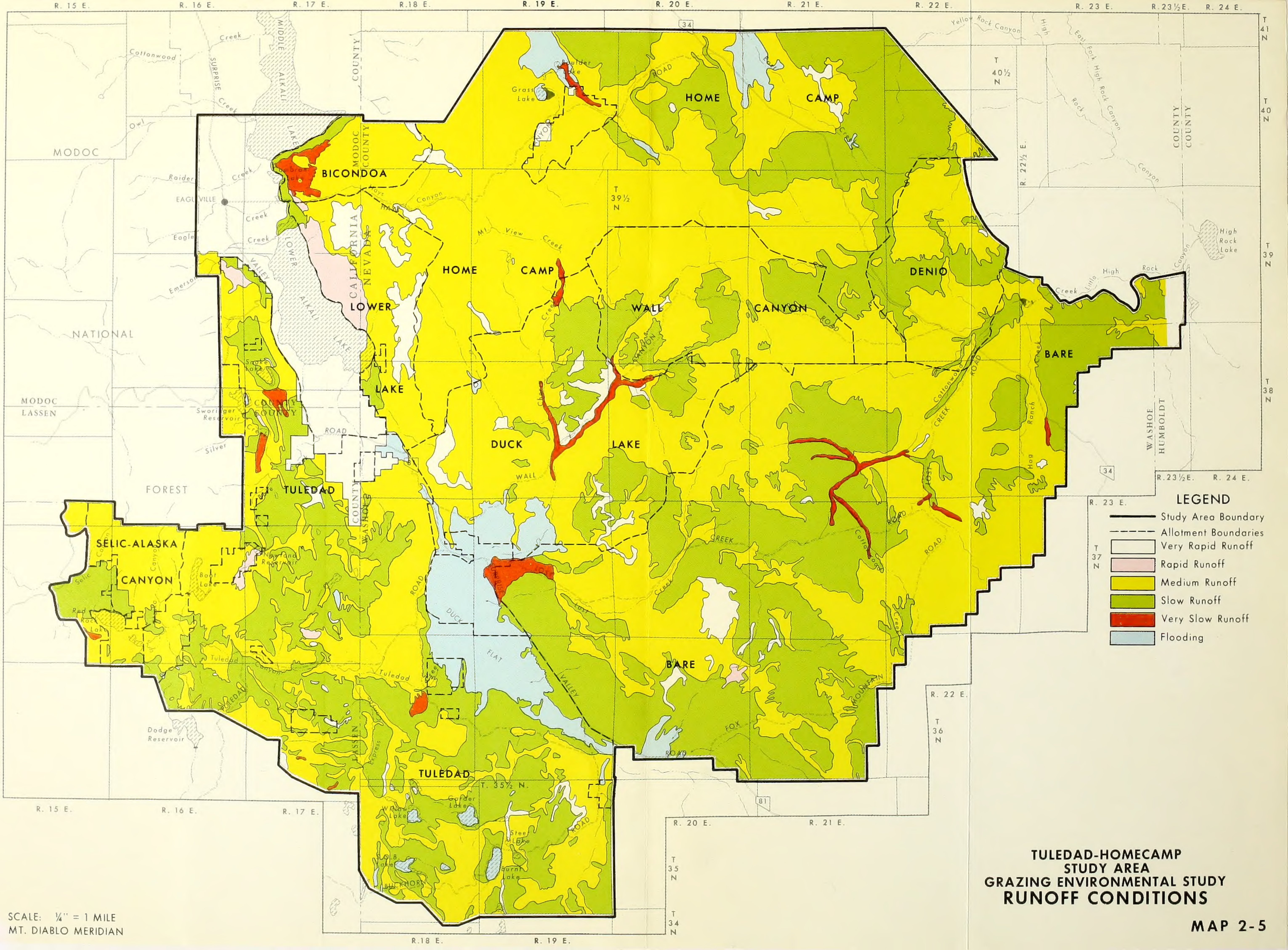
Boulder Lake watershed, 6 percent of the area, receives drainage from nearly 20,000 acres outside of the Tuledad/Home Camp boundaries in addition to the 40,440 acres within the boundaries. Surface and subsurface drainage is internal into Boulder Lake, a perennial body of water.

Long Valley watershed, comprising 5 percent of the area, occupies those portions of the Home Camp and Denio Allotments which have surface and subsurface drainage northwesterly out of the study area into Long Valley to the north. All streams are ephemeral, flowing only during high-intensity precipitation events or unusually heavy snowmelt.

Dodge Reservoir drainage, 4 percent of the area, includes Alaska Canyon Creek and irrigation drainage from Boot Lake. An additional area of about 2,550 acres from the Modoc National Forest to the north contributes approximately 243 acre-feet annually to the water supply in this watershed, mainly from snowmelt.

High Rock watershed, approximately 2 percent of the area, lies along the eastern boundary of the Home Camp Allotment and northeastern Denio Allotment with surface and subsurface drainage into tributaries to High Rock Creek.

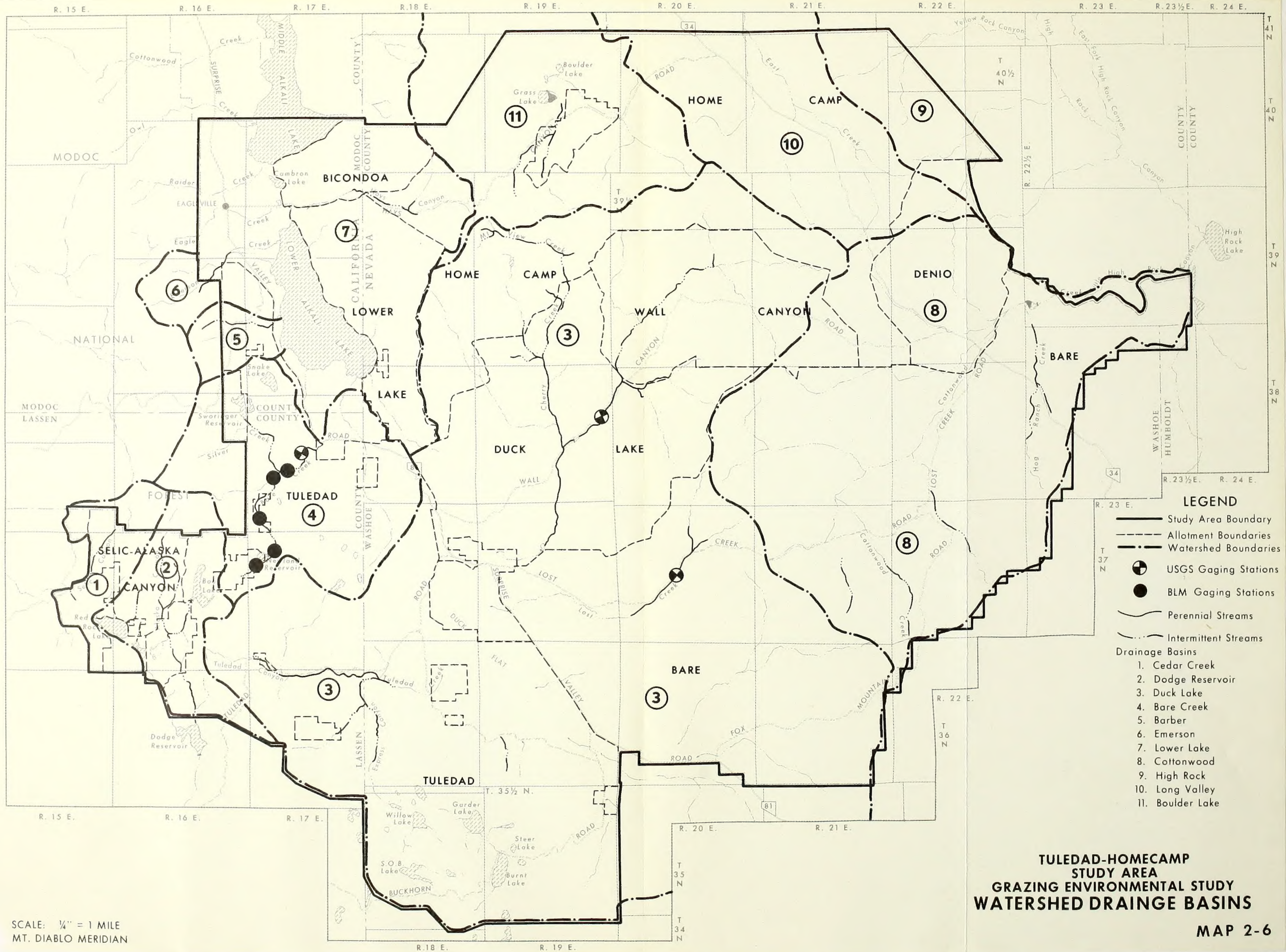
Barber Creek and Emerson Creek watersheds, each covering less than 1 percent of the total



SCALE: ¼" = 1 MILE
MT. DIABLO MERIDIAN

TULEDAD-HOMECAMP
STUDY AREA
GRAZING ENVIRONMENTAL STUDY
RUNOFF CONDITIONS

MAP 2-5



SCALE: ¼" = 1 MILE
MT. DIABLO MERIDIAN

TULEDAD-HOMECAMP
STUDY AREA
GRAZING ENVIRONMENTAL STUDY

WATERSHED DRAINGE BASINS

MAP 2-6

TABLE 2-14
RELATIVE RATES OF SURFACE RUNOFF BY HABITAT TYPE

	Relative Surface Runoff Rates							Systematic Grazing Management Allotments																	
								DUCK LAKE		DENIO		HOME CAMP		LOWER LAKE		TULEDAD		SELIC-ALASKA CANYON		BARE		WALL CANYON	
Habitat Type	Pond (Flooding)	Very Slow	Slow	Medium	Rapid	Total Acres	% of Study Area	Acreage	% of Allot.	Acreage	% of Allot.	Acreage	% of Allot.	Acreage	% of Allot.	Acreage	% of Allot.	Acreage	% of Allot.	Acreage	% of Allot.	Acreage	% of Allot.
3, 23	—					3,152	1	201	1	165	1	1,615	1	0	0	1,093	1	0	0	42	1	20	1
11, 27, 1		—				25,713	4	3,227	6	56	1	2,753	2	759	7	15,417	11	79	1	1,889	1	1,064	3
5	—	—	—			12,256	2	32	1	948	5	5,453	4	67	1	2,569	2	0	0	2,565	1	618	2
10, 13, 2	—	—	—	—		20,426	3	2,025	4	119	1	295	1	1,552	14	14,080	10	29	1	1,611	1	193	1
21			—			80,644	14	1,530	3	5,526	27	37,540	26	0	0	1,458	1	0	0	29,210	17	5,296	16
17, 20, 4			—	—		153,464	26	16,287	33	1,200	6	54,890	37	2,390	22	28,810	20	0	0	36,036	20	13,888	42
12, 25, 6			—	—	—	102,202	17	12,478	25	5,629	27	2,742	2	5,400	48	18,222	12	406	5	55,500	32	820	2
15, 16, 19 14, 8				—		35,274	6	342	1	952	5	8,694	6	186	2	14,132	10	2,738	33	6,301	4	636	2
7, 24, 28				—	—	149,943	25	11,407	23	5,987	29	27,857	19	638	6	46,839	31	4,991	60	40,784	23	10,102	30
9, 18					—	12,810	2	2,201	4	63	1	3,825	3	0	0	3,472	2	78	1	2,322	1	786	2
TOTAL						595,884	100	49,730	100	20,645	100	145,664	100	10,992	100	146,092	100	8,321	100	176,370	100	33,423	100

TABLE 2-14 (Continued)

Custodial Grazing Management Allotments

	Relative Surface Runoff Rates							RED ROCK		COLD SPRINGS		CEDAR		BOOT LAKE		STATE LINE		CLARKS VALLEY		CORRAL		HIGHWAY	
Habitat Type	Pond (Flooding)	Very Slow	Slow	Medium	Rapid	Total Acres	% of Study Area	Acreage	% of Allot.	Acreage	% of Allot.	Acreage	% of Allot.	Acreage	% of Allot.	Acreage	% of Allot.	Acreage	% of Allot.	Acreage	% of Allot.	Acreage	% of Allot.
3, 23	—					3,152	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11, 27, 1		—				25,713	4	25	3	24	11	0	0	0	0	9	6	0	0	211	14	200	15
5	—	—	—			12,256	2	0	0	0	0	0	0	0	0	0	0	0	0	4	1	0	0
10, 13, 2	—	—	—	—		20,426	3	10	1	5	2	0	0	2	1	119	85	5	17	4	1	377	28
21			—			80,644	14	0	0	0	0	0	0	0	0	0	0	0	0	84	6	0	0
17, 20, 4			—	—		153,464	26	39	4	46	22	0	0	1	1	0	0	0	0	989	67	0	0
12, 25, 6			—	—	—	102,202	17	70	8	5	2	6	4	141	36	1	1	1	3	0	0	769	57
15, 16, 19 14, 8				—		35,274	6	35	4	41	19	0	0	0	0	11	8	0	0	28	2	0	0
7, 24, 28				—	—	149,943	25	696	80	93	44	160	96	246	63	0	0	24	80	125	8	0	0
9, 18					—	12,810	2	0	0	0	0	0	0	0	0	0	0	0	0	29	2	0	0
TOTAL						595,884	100	875	100	214	100	166	100	390	100	140	100	30	100	1,474	100	1,346	100

TABLE 2-15
HYDROLOGIC GROUPS BY HABITAT TYPE

							Systematic Grazing Management Allotments															
	Soil Hydrologic Groups						DUCK LAKE		DENIO		HOME CAMP		LOWER LAKE		TULEDAD		SELIC-ALASKA CANYON		BARE		WALL CANYON	
Habitat Type	A	B	C	D	Total Acres	% of Study Area	Acreage	% of Allot.	Acreage	% of Allot.	Acreage	% of Allot.	Acreage	% of Allot.	Acreage	% of Allot.	Acreage	% of Allot.	Acreage	% of Allot.	Acreage	% of Allot.
1, 3, 8, 9, 14, 15, 17, 21, 23, 27					191,279	32	10,938	22	6,475	32	66,052	45	1,725	16	57,273	39	100	1	35,850	20	12,748	38
25, 28					6,406	1	301	1	18	1	0	0	0	0	2,657	2	586	7	2,542	1	79	1
2, 4, 5, 10, 13, 18, 20, 24					147,002	25	14,254	29	2,295	11	48,222	33	2,937	27	25,646	18	107	1	41,857	24	9,731	29
6					71,610	13	4,644	9	5,611	27	2,430	2	5,400	49	10,598	7	10	1	41,940	24	569	2
7					144,625	24	11,157	22	5,987	29	27,470	19	588	5	42,428	29	4,801	58	40,784	24	10,102	30
12					24,796	4	7,533	15	0	0	312	1	0	0	5,389	4	0	0	11,018	6	172	1
16, 19, 26					7,719	1	3	1	259	1	1,178	1	39	1	1,801	1	2,717	33	1,677	1	18	1
11					2,447	1	900	2	0	0	0	0	333	3	302	1	0	0	702	1	4	1
TOTAL					595,884	100	49,730	100	20,645	100	145,664	100	10,992	100	146,094	100	8,321	100	176,370	100	33,423	100

A = Soils with high infiltration and high water-transmission rates.

B = Soils with moderate infiltration and moderate water-transmission rates.

C = Soils with slow infiltration and slow water-transmission rates.

D = Soils with very slow infiltration and very slow water-transmission rates.

TABLE 2-16
WATERSHED BASINS OF THE STUDY AREA

Name	Within Area (Acres)	Outside Area (Acres)	Average Annual Precipitation[1] (Inches)	Total Precipitation (Inches)	Direct Runoff[2] (%)	Direct Runoff[2] (Ac. Ft.)	Interflow[3] (%)	Interflow[3] (Ac. Ft.)	Recharge to Ground Water[2] (%)	Recharge to Ground Water[2] (Ac. Ft.)	Evapo-transportation[4] (%)	Evapo-transportation[4] (Ac. Ft.)
Duck Lake	289,479	31,920	10	240,916	5	12,046	10	24,092	3	7,227	82	197,551
Cottonwood	143,660		8	95,514	2	1,910	10	9,551	0		88	84,052
High Rock	15,280		8	10,234	2	205	10	1,023	0		88	9,006
Boulder Lake	40,440	19,600	12	40,295	7	2,820	10	4,030	7	2,821	76	30,624
Long Valley	31,400		8	20,894	2	418	10	2,089	0		88	18,387
Lower Lake (east)	59,250		8	39,655	2	793	10	3,966	0		88	34,894
Bare Creek	65,920	8,480	16	87,838	12	10,541	10	8,788	15	13,176	63	55,338
Barber Creek	3,680	2,320	20	6,396	17	1,087	10	640	25	1,599	48	3,070
Emerson Creek	2,560	5,120	24	5,117	23	1,177	10	512	25	1,279	42	2,149
Cedar Creek	13,880	3,040	18	21,107	14	2,955	10	2,111	15	3,166	61	12,875
Dodge Reservoir	29,000	2,550	14	33,579	9	3,022	10	3,358	7	2,351	74	24,848
TOTAL	694,549	73,030		601,545	6 (Avg)	36,974	10 (Avg)	60,160	5 (Avg)	31,619	78 (Avg)	472,794

[1] National Weather Service, 1971

[2] Univ. Nevada, Reno, Desert Research Inst., 1977.

[3] Univ. Nevada, Reno, Desert Research Inst., 1977, p. 7.

[4] Remainder %

area, drain into Lower Lake from the west side of Surprise Valley. These and smaller tributaries receive additional flow amounting to approximately 972 acre-feet annually from higher elevations in the National Forest.

Cedar Creek watershed, including Selic Creek as the major tributary, occupies approximately 2 percent of the total area and receives an additional 324 acre-feet runoff annually from higher elevations outside the Selic-Alaska Canyon Allotment, which provides the stream with perennial flow in its upper reaches.

Hydrologic Conditions

Water in the study area is the result of precipitation (rain and snowmelt) within each watershed basin (MAP 2-6). The ultimate destination of large portions of surface and subsurface waters is often not within the areas of water production, where the dominant use is replenishment of soil moisture. The Lower Lake, Long Valley and Barber and Emerson Creeks watersheds are examples of producers with limited on-site use—the major portion of surface runoff and subsurface drainage flow out of the area of consideration.

With precipitation ranging from 8 to 20 inches and slightly higher in upper watershed reaches, total water supply for the study area is about 602,000 acre-feet annually. TABLE 2-16 provides the yield in acre-feet by watershed basin.

Of the total water supply approximately 37,000 acre-feet are direct runoff, 32,000 acre-feet are groundwater recharge, 60,000 acre-feet are interflow, and the remaining 473,000 acre-feet are lost through evapotranspiration.

Combined total water use by large animals is 0.001 of total annual runoff (TABLE 2-17).

Surface Waters

Thirteen perennial streams exist (TABLE 2-18). They range from 2 to 14 miles long and have flows not exceeding 5 cfs (cubic feet per second). These streams originate as springs or seeps or drain highly productive subirrigated meadows. These perennial creeks are the result of water (snow and rain) infiltrating deeper soil mantles and causing subsurface flows of water, some of which may reappear as a spring.

Sworinger and Newlands Reservoirs (TABLE 2-19) in the Bare Creek drainage provide irrigation water for 9,000 acres of alfalfa and native meadow on the Bare Ranch.

Streamflows from Boardwell Creek and Wall Creek combine to provide water for Wall Canyon Reservoir. Water from this reservoir irrigates 2,400 acres of alfalfa at Duck Flat.

Of the three natural lakes in the study area only Boot Lake is used for irrigation purposes. Red Rock Lake is a closed basin which receives water from the meadows irrigated from Boot Lake. Boulder Lake, also a closed basin, receives water from a drainage area of 60,400 acres.

SURFACE RUNOFF

There are no permanent weather or gaging stations within the study area to measure stream runoff or precipitation. The closest reliable stations are Fort Bidwell and Likely and on Willow Creek in California and Leonard Creek in Nevada.

Despite the apparent consistencies in average monthly precipitation, seasonal and storm intensities vary dramatically. FIGURE 2-5 shows the precipitation intensity changes for the duration of 6- to 24-hour storms with return periods from 2 to 100 years for the study area (U.S. Dept. Commerce, NWS, 1972).

The least permeable soils here are those having vesicular surface structure with infiltration rates from less than .06 inch to 0.20 inch per hour. These soils (Lolak, Bicondoa, Disabel, Boulder, and Weimer) are located in lake beds and level valley floors. On these soils, surface run-off is expected from almost any storm which produces significant quantities of moisture regardless of the storm intensity but particularly from high-intensity summer rainstorms which catch the surface soil in its driest and most compacted state. These soils make up only about 5 percent of the total area. FIGURE 2-5 also shows that a 10-year storm at a six-hour intensity (.20 in/hr.) is required to cause surface runoff from the additional 25 percent of the area. These are very shallow soils (<1 foot) which have a limited capacity to hold large quantities of water. These soils are associated with the low sage vegetative association groups (TABLE 2-1).

Soil permeability for the remaining 70 percent of the area has rates from 0.6 to 6.0 inches per hour. Therefore, a storm producing moisture at a higher frequency and intensity than the 100-year six-hour storm is required before surface runoff would normally occur on this 70 percent of the area.

TABLE 2-17

TOTAL ANNUAL CONSUMPTIVE USE OF WATER BY LARGE ANIMALS 1/

Allotment	Livestock 2/	Deer 3/	Antelope 4/	Wild Horses 5/	Total
Denio	490				
Wall Canyon	790				
Bare	4,490			583	
Lower Lake	209				
Duck Lake	1,083				
Home Camp	2,928				
Selic-Alaska Canyon	372				
Tuledad	3,284			1,469	
Bicondoa	110				
Custodial Allotments	110				
TOTAL	13,866	456	162	2,052	16,536

1/ In 1,000 gallons
2/ Based on 300 gallons per livestock AUM
3/ Based on 12 gallons per deer per month.
4/ Based on 12 gallons per antelope per month.
5/ Based on 360 gallons per horse per month.

TABLE 2-18
MAJOR PERENNIAL STREAMS IN THE STUDY AREA AND THEIR USES

Perennial Streams	Allotment	Length (Miles)	Surface Water Low Flow (cfs)	Uses[1/]
Bare Creek	Tuledad	7.0	4-5	L-W-I-F
Emerson Creek	Tuledad	2.0	1-2	L-W-I-F
Barber Creek	Tuledad	2.8	1	L-W-I-F
Alaska Canyon Creek	Selic-Alaska Canyon	3.5	2-3	L-W-F
Selic Creek	Selic-Alaska Canyon	2.8	1	L-W-F
Lost Creek	Bare	8.0	1	L-W-I
Wall Creek	Duck Lake-Wall Canyon	14.0	3	L-W-I
Cherry Creek	Home Camp-Duck Lake	12.0	1	L-W-I
North Creek	Tuledad	2.8	1	L-W-I-F
Boardwell Creek	Duck Lake-Wall Canyon	2.0	1	L-W-I
Silver Creek	Tuledad	3.0	3-4	L-W-I-F
Tuledad Creek	Tuledad	7.5	2	L-W
Express Canyon Creek	Tuledad	5.2	1	L-W

[1/] L-Livestock, W-Wildlife, I-Irrigation, F-Fishing

Source: Inventory Data, Cedarville Area Office, BLM.

TABLE 2-19

MAJOR SURFACE WATERS IN THE STUDY AREA

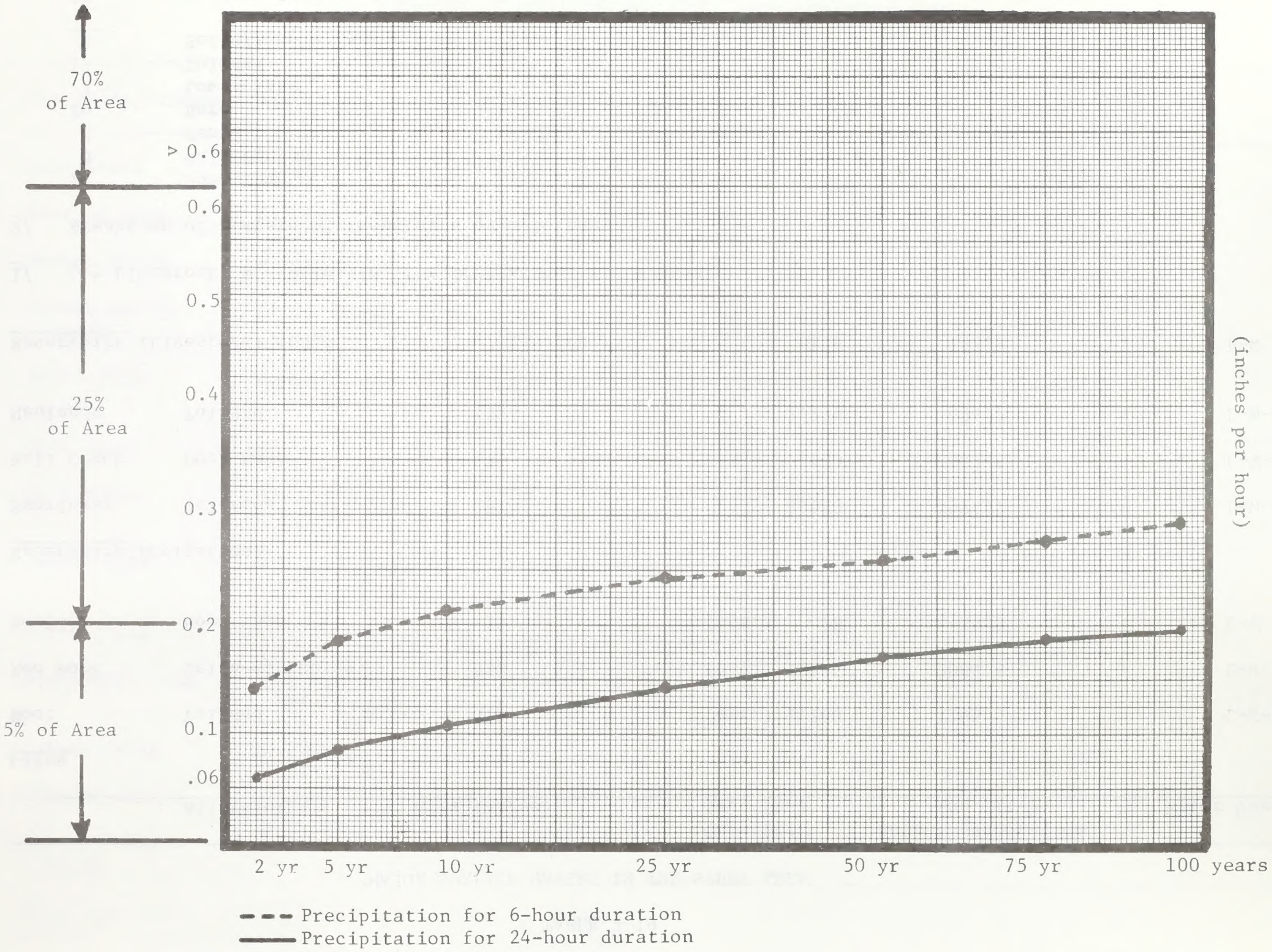
	Allotment	Area (acres)	Capacity (ac. ft.)	Annual Evaporation (ac. ft.)	Water Uses 1/
Lakes					
Boot	Tuledad	315	(est.) 1,260	1165.5	L-W-I
Red Rock	Selic-Alaska Cy.	558	(est.) 1,395	2064.6	L-W
Boulder	Home Camp	15	(est.) 78	55.5	L-W
Reservoirs (Irrigation)					
Sworinger	Tuledad	291	4,050	1976.7	L-W-I
Wall Creek	Duck Lake	175	400	647.5	L-W-I-F
Newlands	Tuledad	135	2,279	484.7	L-W-I-F
Reservoirs (Livestock) (68) 2/		.7 (av. ea.)	81.6	143.9	L-W

1/ L = Livestock, W = Wildlife, I = Irrigation, F = Fishing

2/ Breakdown of numbers of reservoirs by allotment:

15	Home Camp
3	Wall Canyon
3	Denio
26	Bare
2	Lower Lake
19	Tuledad
0	Selic/Alaska Canyon
68	Average Area = .7 ac. (est.)

FIGURE 2-5
Soil Permeability and Precipitation Rates



The total water yield, expressed in acre-feet and percentages, is presented on TABLE 2-16 (Watershed Basins). Runoff ranges from 2 percent in Cottonwood, High Rock, Long Valley, and Lower Lake watersheds to 23 percent in Emerson Creek watershed. Average runoff in these watersheds is 6 percent.

Ground Water

Duck Lake Valley and Surprise Valley are the two major ground water basins. There is no ground water movement between the two. The source of recharge to the ground water reservoirs is precipitation.

Of the wells in the Duck Lake basin that were inventoried, 16 with adequate data were compared as to elevation and depth to water. Surface altitudes ranged from 4,665 to 4,910 feet and depths to water ranged from 4 feet to 120 feet (Sinclair and Malchow, 1963). Elevations of the water tables range from 4,616 to 4,846 feet. The 230-foot difference indicates the probability of many perched water tables. This is perhaps the reason for the abundance of springs.

The study area has a surface of varied lithographic character (MAP 2-7). However, the occurrence of springs is apparently not restricted to any particular lithographic region. Jointing and interbedding of impermeable rhyolite with permeable vessicular basalt and sandstone provide the media for both recharge and discharge at various elevations.

Faulting (MAP 2-7) is common and apparently affects ground water movement (Calif. Dept. Water Resources, n.d.). On public lands flows of springs developed by BLM range from 0.1 gallon per minute to 6 gallons per minute; many are very sensitive to fluctuations of climatic cycles. In past years, consecutive years of below-normal precipitation have resulted in no flow in the weaker springs.

Interflow

Interflow is that portion of water that may flow laterally underneath the ground surface yet is shallow enough to be within the root zones of vegetation. It does not percolate deeper to recharge an aquifer.

A constant 10 percent rate of interflow is used for each of the watershed basins (TABLE 2-16). This figure is derived from the analysis and comparison of Bidwell Creek and Leonard Creek watersheds (Univ. Nevada, Reno, Desert Research Inst., 1977).

These laterally flowing waters eventually supply water to streams, springs, seeps and subirrigated meadows.

The physical and chemical properties of three major streams in the study area have been analyzed. TABLE 2-20 displays the data on Lost, Wall, and Bare Creeks since 1973. Fisheries studies have provided data from four additional sites along Bare Creek. The 1976 data are displayed on TABLE 2-21. There are no permanent facilities or continuous monitoring systems associated with these streams. Since stream samples have been taken in early spring or late fall seasons, the water-quality data presented here are baseline data not intended to indicate trends.

Water from wells in the Duck Lake watershed was analyzed by USGS (TABLE 2-22) in conjunction with Sinclair and Malchow's (1963) groundwater appraisal. The locations of existing wells installed by BLM in cooperation with range users are shown on MAP 2-8. Wide variability in chemical constituents suggests noncontinuous aquifers.

All waters sampled are objectionable or of marginal value because of high bicarbonate concentration (Sinclair and Malchow, 1963). High bicarbonate ion concentration is fairly typical of water from lakebeds in other closed basins in Nevada (Sinclair and Malchow, 1963).

Water Use

CONSUMPTIVE USE OF WATER

Exclusive of water used for irrigation, the dominant use is by large animals (TABLE 2-17).

Livestock use at the 1976 level of grazing ranges from 39.1 to 40.5 acre-feet annually. The present estimated numbers of deer, antelope, and wild horses use another 2.6 acre-feet; with the ongoing reduction of wild horses and anticipated increase in deer numbers, this use is expected to increase to 3.5 acre-feet. Combined total use of water by large animals is 0.001 of total annual runoff.

The only year-round residence in the entire Tuledad/Home Camp Study Area, exclusive of the private lands in Surprise Valley, is the Bare Ranch. All other dwellings are seasonal and are occupied only when livestock are being worked. Total domestic use of water is estimated at less than 2.5 acre-feet annually.

TABLE 2-20

PHYSICAL AND CHEMICAL PROPERTIES OF WATER IN THE STUDY AREA

	BARE ALLOTMENT		DUCK LAKE ALLOTMENT		TULEDAD ALLOTMENT
	Lost Creek		Wall Creek		Bare Creek
	10-1-73	2-20-74	10-2-73	9-24-75	9-24-75
PHYSICAL:					
Color	Clear	None	Milky	Slightly	None
Odor	None	None	Salty	Salty	None
Temperture, °C	11	8	8	23	10
Discharge, cfs	0.5	0.6	2.0	3.3	5.0
Sediment, mg/l	0.0	19.0	0.0	19.4	8.1
CHEMICAL:					
Dissolved oxygen, mg/l	10.8	11.5	12.9	9.6	11.1
pH, units	8.2	7.2	8.5	8.4	7.7
Specific conductance (micromho/cm at 25°C)	102	101	175	180	140
Alkalinity, carbonate, mg/l as $CaCO_3$	35	32	77	69	71
Bicarbonate, mg/l as HCO_3	43	39	90	84	86
Boron, ug/l as B	90	40	90	80	10
Carbonate, mg/l as CO_3	0	0	2	0	0
Calcium, mg/l as Ca	6.4	8.3	10	9.3	13
Chloride, mg/l as Cl	4.3	4.7	4.5	4.7	0.2
Dissolved solids, mg/l	102	100	149	-	0
Dissolved solids, Tons per acre foot	0.14	0.14	0.2	0.18	-
Fluoride, mg/l as F	0.4	0.2	0.5	0.4	0.1
Hardness, mg/l as $CaCO_3$	23	29	42	33	0
Iron, mg/l as Fe	110	230	60	120	10.0
Magnesium, mg/l as Mg	1.8	2.0	4.2	2.4	5.8
Mercury, mg/l as NO_2	-	-	-	-	-
Nitrate, mg/l as NO_3	0.67	1.3	0	0.08	0
Phosphate, ortho, mg/l as PO_4	140	0.28	0.40	0.34	0.02
Phosphate, orthophosphate, mg/l as PO_4	0.13	0.09	0.13	0.11	0.06
Silica, mg/l as SiO_2	45	42	56	48	27
Sodium absorption ratio	1.1	0.9	1.3	-	0.3
Sodium, mg/l as Na	12	11	19	20	5.5
Sulfate SO_4	-	6.3	7.9	-	0
ALGAE:					
Filamentous					Sparse
Nostoc				Very Heavy	
DETAILED FAUNA: 1/					
Caddisfly-larvae				27	
Ceratopognon				5	
Physa				5	
Snails-nonphysa				3	
Beatles-adult				4	
Beatles-larvae				1	
Flat Snail				1	
Mayfly				4	47
Tendipes					47
Stonefly					6
Caddisfly				39	15
Simulium				2	1
Pupae					2
Worm					1
E. coli 2/				100	35

1/ Numbers of organisma.
2/ Numbers of colonies per 100 ml.

Source: USGS contract with BLM, 1973

TABLE 2-21

BARE CREEK FISHERIES ANALYSIS 1976

	Sampling Sites				
	#1	#2	#3	#4	#5
Hardness (T.H.-mg/1)	5.9	6.3	6.5	6.8	5.7
Calcium (Ca-mg/1)					
Magnesium (Mg-mg/1)					
Sodium (Na-mg/1)	7.0	7.5	7.0	6.3	7.2
Potassium (K-mg/1)					
Alkalinity					
HCO_3 (mg/1)	9.0	9.7	9.4	6.6	6.6
CO_3 (mg/1)	0.0	0.0	0.0	11.0	11.0
pH	8.0	8.1	8.0	8.9	8.9
Sulfate (SO_4-mg/1)					
Chloride (Cl-mg/1)	1.0	1.7	1.3	1.7	1.7
Nitrate (NO_3-mg/1)					
Fluoride (F-mg/1)					
Boron (B mg/1)	0.0	0.0	0.0	0.0	0.0
Turbidity	4A	4A	3A	4A	4A
Dissolved Solids (T.D.S.-mg/1)					
Specific Conductance (micro/cm)	149	156	151	142	142
Silica (SiO_2-mg/1)					

TABLE 2-22
CHEMICAL ANALYSES OF GROUND WATER IN DUCK LAKE VALLEY, WASHOE COUNTY, NEVADA [1]

Twn.	Rng.	Sec.	Date of Collection	Temperature (°F)	Silica (Si)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Carbonate (CO_3)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Hardness as $CaCO_3$		Specific conductance (micromhos at 25°C)	Dissolved solids residue at 180°C	Sodium absorption ratio (SAR)	Residual sodium carbonate (RSC) in equivalents per million	pH
																	Noncarbonate	Calcium and Magnesium					
37	18	2ba1	05-06-61	55	42	24	15	206	4.9	5	311	164	94	0.7	0.2	0.45	0	120	1100	702	8.2	2.9	8.3
37	18	34a1	05-06-61	56	56	32	9.0	88	3.8	22	268	42	10	.6	.2	.23	0	116	561	393	3.5	2.8	8.7
37	19	19c1	05-06-61		34	6.4	.2	55	.6	0	128	15	11	.3	.3	.32	0	17	264	186	4.2	1.8	8.2
36	10	21d1	05-06-61		23	345	122	1140	40	0	196	2070	1160	.1	1.1	.51	1200	1360	6860	5160	13.3	0	7.3
35	19	1b1	05-06-61		42	45	9.5	71	1.7	0	273	52	24	.6	.9	.24	0	152	574	372	1.8	1.5	8.1

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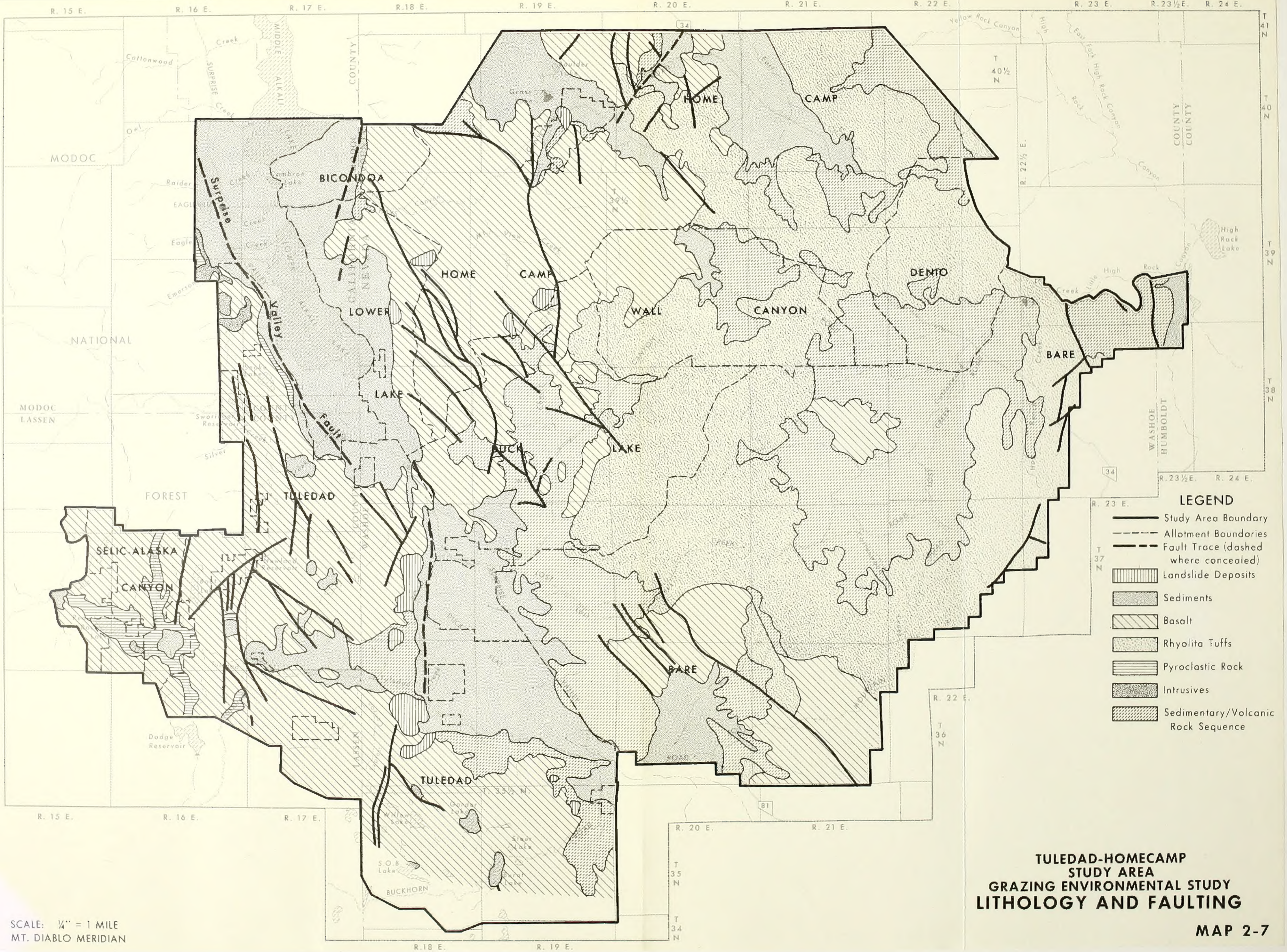
[1] Analyses by U. S. Geological Survey. Constituents in parts per million.

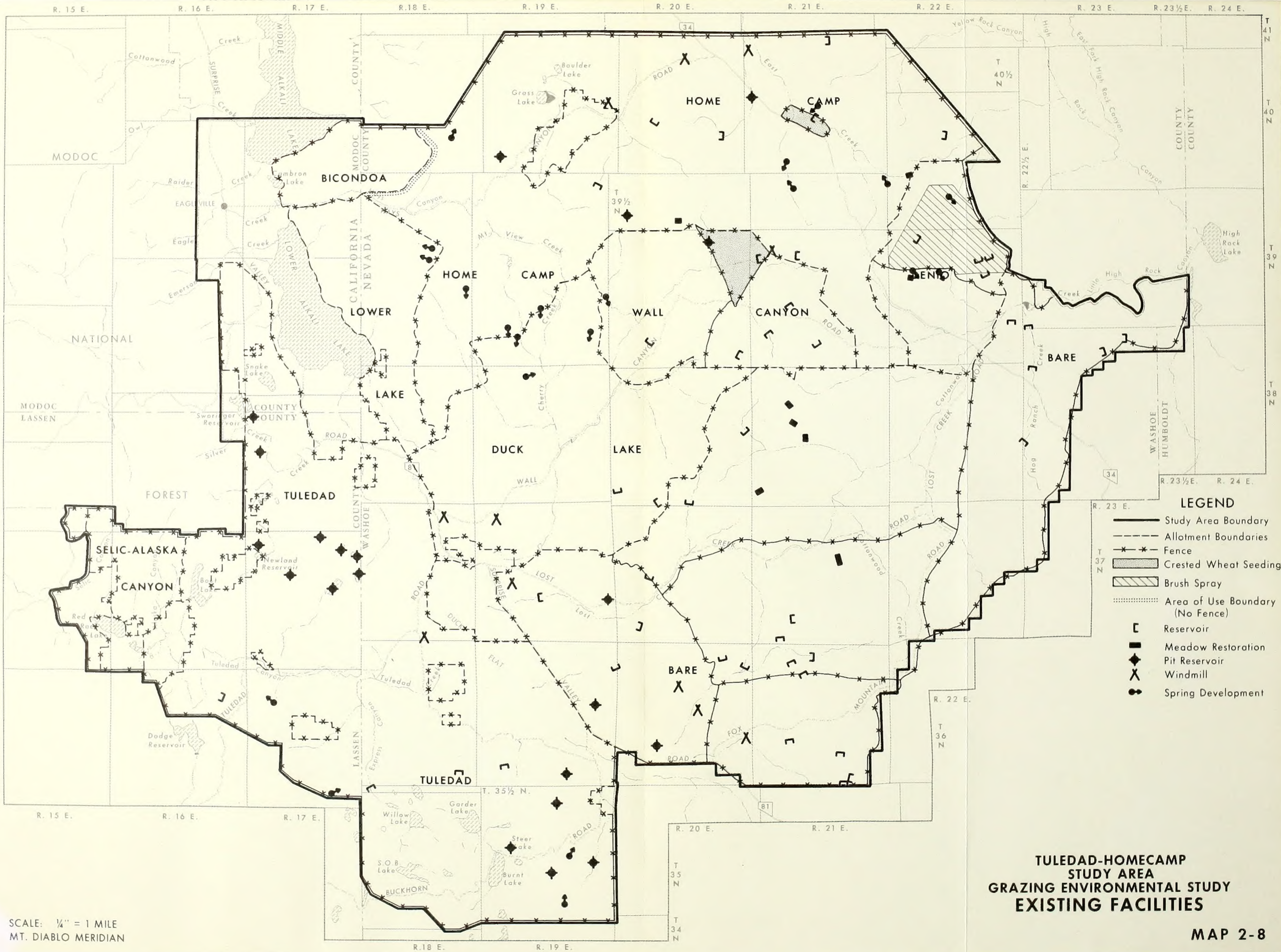
Source: Sinclair and Malchow, 1963



SCALE: ¼" = 1 MILE
MT. DIABLO MERIDIAN

TULEDAD-HOMECAMP
STUDY AREA
GRAZING ENVIRONMENTAL STUDY
LITHOLOGY AND FAULTING

MAP 2-7



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TULEDAD-HOMECAMP
STUDY AREA
GRAZING ENVIRONMENTAL STUDY
EXISTING FACILITIES

MAP 2-8

Evapotranspiration

Direct run-off, interflow, recharge, and base streamflows equal approximately 20 percent of the total precipitation (TABLE 2-16). This is in reasonable agreement with USGS studies (Branson, et al., 1972) that show 80 to 90 percent of the precipitation that annually reaches rangeland is lost through evapotranspiration.

ANIMALS

Terrestrial Animals

Large mammals include Rocky Mountain mule deer, pronghorn antelope, and mountain lion. In California, Rocky Mountain mule deer occur most abundantly in the northeastern part of the State; Modoc and Lassen Counties, have had the highest deer harvests in California. The deer herds in the northwestern Nevada portion of the Tuledad/Home Camp Study Area are also important to that State. Antelope are common in northeastern California and northwestern Nevada and are in great demand for hunting.

Common small mammals in the study area are rabbits, hares, and rodents. Predators include coyotes, bobcats, badgers, skunks, and weasels.

Sage grouse, California and mountain quail, mourning doves, ducks, geese, and introduced chukar partridge are game birds of regional and State importance. Hawks and eagles are conspicuous nongame birds.

The largest populations of sage grouse in California remain in Modoc and Lassen Counties. The State of Nevada considers sage grouse the most important upland game bird in their portion of the study area.

Chukar partridge occur in the study area but are absent from most of the remainder of California. The bird is very popular with hunters in California and Nevada.

California and mountain quail are hunted in both States but are not abundant.

Mourning doves nest in abundance in the area but usually migrate before hunting season.

Waterfowl production within the area contributes birds to the California Central Valley wintering areas.

Bald eagles and peregrine falcon have been observed in the study area and are on the U.S. Fish and Wildlife Service list of endangered and threatened wildlife. Neither is known to nest or regularly inhabit the area.

GAME SPECIES

Mule Deer

Mule deer are the most abundant big game animal in the area. The area provides habitat for both migratory and resident populations.

Various early accounts attest to the scarcity of deer in northeastern California and northwestern Nevada until after the 1890s and early 1900s (Nev. Dept. Fish and Game, 1964; Brown, 1945; Salwasser, 1976). Herds built steadily through the 1930s and 1940s, maintained high levels during the 1950s and early 1960s and have generally declined since. Current deer numbers in the study area are estimated at approximately 1,200 in Nevada and 3,000 in California. TABLE 2-23 shows deer population by area and season of use.

TABLE 2-23.—*Mule deer population numbers in the study area*

[Deer herd management unit (Nevada)]

Season of use	*012*[1]	*013*[2]	*014*[3]	*015*[4]	*Calif.*[5]	*Total*
Year long	68	360	126	458		1,012
Dec. 1–April 31				1,360		1,360
April–Oct					3,000	3,000
Nov.–Dec					1,000	1,000

[1] Includes portions of the Home Camp, Denio, and Bare Allotments.
[2] Includes portions of the Home Camp, Wall Canyon, Lower Lake, Bicondoa, Duck Lake, and Bare Allotments.
[3] Includes portions of the Bare Allotment.
[4] Includes portions of the Tuledad Allotment.
[5] Includes portions of the Tuledad and Selic-Alaska Canyon Allotments.

Deer movements in Nevada are largely altitudinal and are controlled by winter weather patterns and forage availability. Deer are forced to lower elevations by deepening snow and return in the spring as grass greens up at higher elevations. During mild winters, deer use summer and intermediate ranges, but during winters with deep snow, they move to sagebrush-covered alluvial fans. The deer herd in California is largely migratory and moves from summer and intermediate ranges in the Tuledad area to winter ranges in the southern end of the study area in Nevada, and to the south outside the study area. During open winters many migratory deer remain on the intermediate range in California.

MAP 2-9 depicts the distribution of deer ranges in the study area. Actual summer and intermediate ranges are patches of suitable habitat within the delineated areas shown on MAP 2-9. Winter ranges shown on MAP 2-9 are concentration areas. Other widely diffused winter- use areas are not shown. Areas of high deer concentrations having particular significance in the study

TABLE 2-23

MULE DEER POPULATION NUMBERS IN THE STUDY AREA

	Deer Herd Management Unit (Nevada)					
Season of Use	012 1/	013 2/	014 3/	015 4/	Calif. 5/	Total
Yearlong	68	360	126	458		1,012
Dec. 1-April 31				1,360		1,360
April-Oct.					3,000	3,000
Nov.-Dec.					1,000	1,000

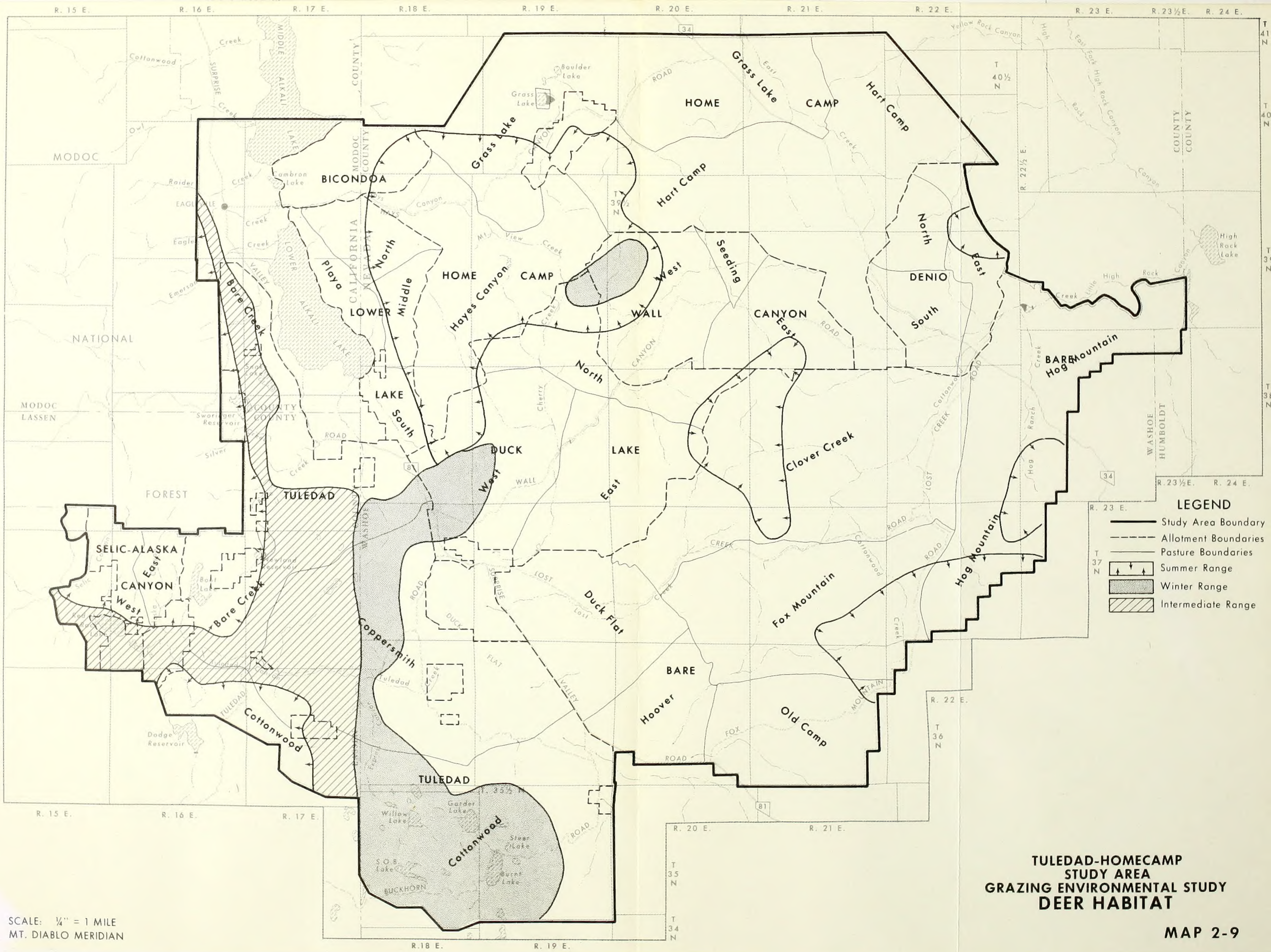
1/ Includes portions of the Home Camp, Denio, and Bare Allotments.

2/ Includes portions of the Home Camp, Wall Canyon, Lower Lake, Bicondoa, Duck Lake, and Bare Allotments.

3/ Includes portions of the Bare Allotment.

4/ Includes portions of the Tuledad Allotment.

5/ Includes portions of the Tuledad and Selic-Alaska Canyon Allotments.



TULEDAD-HOMECAMP
STUDY AREA
GRAZING ENVIRONMENTAL STUDY
DEER HABITAT

MAP 2-9

SCALE: ¼" = 1 MILE
MT. DIABLO MERIDIAN

area are the summer areas in the western part of the Tuledad Allotment, the summer-yearlong areas in Bare and Home Camp Allotments, and the winter concentration area in the Tuledad Allotment.

Deer ranges are currently in poor condition. Deer forage and cover plant distribution is greatly reduced, variety has decreased, and reproduction is limited or absent.

Important deer food and cover plants in the study area include bitterbrush, curlleaf mountain mahogany, grasses, sagebrush, aspen, snowbrush, snowberry, serviceberry, bitter cherry, chokecherry, and a variety of perennial forbs. In a two-year study, Daughty (1966) found bitterbrush, curlleaf mountain mahogany, snowbrush, and grasses to be the primary forage species used in the study area between May and September. Dietary overlap involving several species of grasses, forbs, and shrubs among horses, cattle, sheep, deer, and antelope in the study area was demonstrated by fecal analysis data obtained from July through October, 1976 (see TABLES 2-36 and 2-37).

Bitterbrush is the single most important forage species for deer from midsummer through early winter (Daughty, 1966; Leach, 1956; and Tueller and Monroe, 1974). Of 17 stands of bitterbrush analyzed in the study area, 15 were in unsatisfactory condition in relation to degree of hedging and browse availability (TABLE 2-24). Only two stands, in the Denio Allotment, were in satisfactory condition. Berg (1966) and Tueller and Monroe (1974) indicate that much bitterbrush use is attributable to livestock. Antelope also forage on bitterbrush during summer and fall. Twelve of 17 bitterbrush stands sampled exhibited a downward trend (TABLE 2-25). In three stands sampled, trend was up and in two stands trend was static. Bitterbrush occurs primarily in HT-7, 15, 18, 19, and 25. Vegetative inventory data indicate that all the habitat types mentioned above, except 15, are supporting less bitterbrush than site potential indicates is possible.

Mountain mahogany is important to deer for both food and cover. Daughty's (1966) study on Fox Mountain, within the study area, indicated that, next to bitterbrush, curlleaf mountain mahogany was the plant most heavily used by deer. Livestock also use curlleaf mountain mahogany.

The larger tree-like stands, while occupying less than 1 percent of the study area, are important for cover and are the most heavily used areas for fawning (Swickard and Conrad, 1975). Of six curlleaf mountain mahogany stands sampled (where 20 or more plants were sampled) half were in satisfactory condition and half were unsatisfactory. The apparent trend was up in five of the six stands and static in one. Curlleaf mountain mahogany stands have invaded HT-7 (big sagebrush/Idaho fescue). Curlleaf mountain mahogany occurs in HT-7 and 25.

Grasses and forbs are used seasonally by deer. Grasses are important components of the does' diet in early spring as a transition from subsistence winter forage to high protein forage before giving birth. Fawn production on the study area is low (20 fawns per 100 does in a 1975 fall census) and winter losses are high (est. 63-71 percent in 1973 and 47 percent in 1974) (Nev. and Calif. Depts. Fish and Game Annual Repts., 1973-75). Of the habitat types important to deer for spring forage, HT-6, 7, 15, 17, 18, and 24 are lacking in density and variety of native perennial grasses for deer. Habitat types 13 and 27 are reduced from their former size and, where these types exist, vegetation is heavily utilized by livestock and in low vigor. Competition between livestock and deer appears to be greatest in early spring when both seek newly emerging grass shoots.

A wide variety of forbs with different phenological development are important to deer throughout the summer to supply protein-rich forage to developing fawns and nursing does. Of the habitat types important to deer for spring and summer forage, HT-6, 14, 15, 16, 18, 19, and 20 are lacking density and composition of native perennial forbs for deer. Habitat types 13 and 27 have variety but forage is almost completely removed by livestock. Habitat types 13 and 27 have also been invaded by shrub species; many sites formerly covered by meadow and riparian vegetation no longer exist. Habitat type 17 contains many forbs but few are desirable native perennials. Habitat types 7, 24, and 25 contain amounts of native perennial forbs commensurate with the type's capability of production.

Sagebrush, while not a preferred species, is an important component of the deer's winter diet. Sagebrush occurs throughout the study area, in almost all habitat types, and is the most abundant

TABLE 2-24

CONDITION OF ANTELOPE BITTERBRUSH BROWSE RANGES BY ALLOTMENT [1]

S = satisfactory condition

U = unsatisfactory condition

Allotment	U	S	Condition (U or S)	Probability [2] (U or S)
Home Camp	4	0	U	0.938
Bare	2	0	U	0.750
Denio	0	2	S	0.750
Tuledad	9	0	U	0.998
Total of all Transects	15	2	U	0.999
Total of all but Tuledad	6	2	U	0.891

[1] Only transects with 20 or more bitterbrush individuals sampled have been used.

[2] Probability of condition was determined with the binomial distribution.

TABLE 2-25

APPARENT TREND OF ANTELOPE BITTERBRUSH BROWSE RANGES BY ALLOTMENT 1/

Allotment	Apparent Trend	Probability of Apparent Trend 2/	Sample Size
Home Camp	down	0.98 p 0.95	4
Bare	down	p 0.50	2
Denio	static 3/	p 0.50	2
Tuledad	down	0.80 p 0.50	9
Bare Creek 4/	static 3/	p 0.50	(5)
Cottonwood 4/	down	0.95 p 0.90	(3)
Coppersmith 4/	down	p 0.50	(1)
Total of all Transects	down	0.99 p 0.98	17
Total of all but Home Camp	down	0.80 p 0.50	13

1/ Only transects with 20 or more bitterbrush individuals sampled have been used.

2/ Probability of apparent trend was determined by the Kolmogorov-Smirnov test for goodness of fit. Probability expressed is 1-p (null hypothesis, i.e., no trend).

3/ Trend appears equally up or down. Probability expressed is the probability of the null hypothesis (i.e., no trend).

4/ Bare Creek, Cottonwood, and Coppersmith pastures of Tuledad Allotment.

shrub. Use is light on sagebrush and plants are in good condition.

Snowbrush, serviceberry, snowberry, bitter cherry, chokecherry, and aspen are preferred by deer as forage and as fawning cover. All but aspen are in good condition and receive little use from livestock. Both Daughty (1966) and Leach (1956) note moderate summer use of these species by deer. Swickard and Conrad (1975) and Smith (1976) noted the heavy use of the mountain brushfields by deer for fawning. These areas provide cover needed to protect fawns from predators. Mountain brushfields occur in small areas at higher elevations in HT7, 15, 18, 19, 25, and 26. Aspen stands (HT-26) are heavily used by livestock and are in poor condition with a downward trend; they are not reproducing and are being invaded by other vegetation. The stands provide poor fawning cover.

The Tuledad, Home Camp, and Bare Allotments contain the largest percentage of deer habitat in the study area and their management has the greatest impact on the deer herds.

Pronghorn Antelope

Antelope observations were frequently recorded in the journals of travelers of the mid-1800s (Nev. Dept. Fish and Game, 1964). Populations were high but numbers unknown. By the early 1900s, it was feared the antelope would become extinct in California and Nevada. In the 1920s, populations reached their lowest levels but have since increased. Populations are now at the highest recorded levels and the trend is still upward. Based on winter and summer aerial surveys, California and Nevada Departments of Fish and Game estimate current numbers in the area to be approximately 1,200 during the summer and 1,000 during the winter.

MAP 2-10 shows the distribution of antelope habitat. Summering animals are scattered over the eastern half of the area with animals usually found on the high tables around Hays Peak and High Rock Canyon as well as in the lower valley areas of Clover Creek, Pinto Springs, Hart Camp, and Little Weimer Spring. Antelope are also found in the Snake Lake area, and from the Coppersmith Hills south to the SOB Lake area in the Tuledad Allotment during the summer.

Most antelope move to winter range around Duck Flat and the southernmost sections of the Bare and Tuledad Allotments. Some drift further south out of the study area. Antelope in the northern part of the study area winter in the Grass Lake-Boulder Lake area with some wintering outside the study area to the north. According to Hess (1977), Duck Flat and the surrounding antelope winter ranges contain the highest densities of wintering antelope in Nevada.

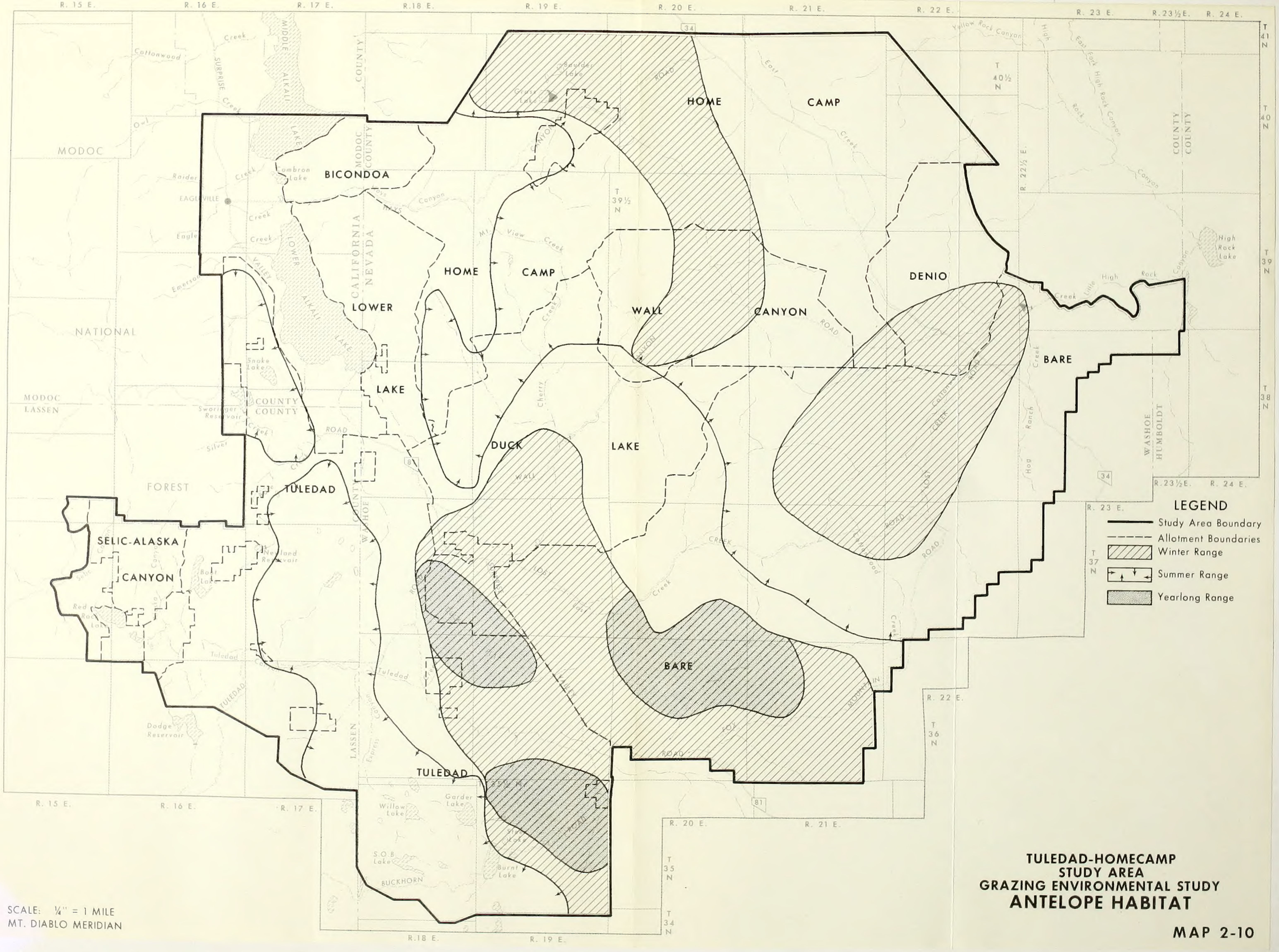
Antelope ranges currently appear to be in satisfactory condition. Low sagebrush, rabbitbrush, and shadscale, antelope dietary staples, are scattered throughout the study area in abundance. These plant species are used throughout the year but are consumed most heavily during the winter, although they show light use.

In the spring, antelope food preferences turn to forbs, with these plants becoming the most important antelope forage during spring and summer. A variety of annual and perennial forbs used by antelope occur on the habitat types antelope inhabit except for HT-12 and 20—these are almost devoid of forbs. Most habitat types, however, do not contain the variety and amount of perennial forbs expected at site potential (see Chapter 2, Vegetation).

A competition problem between livestock and antelope occurs on spring and summer ranges (see TABLES 2-36 and 2-37). A small volume of forage is produced because of early cattle and sheep turnout. With the small volume available, livestock consume the most succulent forbs and grasses as they come up. Antelope are then short of high-protein forage needed to recover from the rigors of winter and to prepare for the birth of kids. The competition continues throughout the summer on meadow and riparian vegetation of HT-13 and 27. Competition also occurs on HT-23 (baltic rush) when these areas flooded. Habitat type 23 occurs on periodically flooded lakes including Garden Lake and Grass Lake. Livestock congregate in these areas of available water and succulent vegetation. As a result, HT-13 and 27 are being invaded by less desirable vegetation.

During summer and early fall, antelope make heavy use of bitterbrush (Tsukamoto and Diebert, 1968; and Hanley, 1977), along with livestock and deer. Competition for bitterbrush is high and plants are severely grazed (see TABLES 2-24 and 2-25).

Competition for spring and summer forage may, in part, explain the poor reproductive success of antelope in the study area. Summer observations indicate a five-year average of 48 kids per 100



SCALE: ¼" = 1 MILE
MT. DIABLO MERIDIAN

TULEDAD-HOMECAMP STUDY AREA GRAZING ENVIRONMENTAL STUDY ANTELOPE HABITAT

MAP 2-10

does in northeastern California and flights in 1974 indicate 40 kids per 100 does is the production rate for northwestern Nevada (Calif. and Nev. Depts. Fish and Game, Annual Rept., 1974).

Rabbits and Hares

The pigmy rabbit, Nuttall cottontail, and black-tailed jackrabbit are known to occur and the white-tailed jackrabbit is a suspected inhabitant.

Jackrabbits occur primarily in HT-1, 4, 11, and 12 on flat areas at lower elevations. These areas have low productivity—250 to 500 pounds of air-dry forage per acre (Summerfield and Bagley, 1974) and supply open running room required by jackrabbits.

Pigmy rabbits occur in HT-2 and 10 where dense brush escape cover is plentiful. The Nuttall cottontail range overlaps that of the pigmy but the Nuttall makes use of rocky areas. Habitat type 10 is in poor condition and is lacking in grass and forbs (Chapter 2, Vegetation) required by pigmy rabbits.

Large Mammal Predators

The mountain lion, bobcat, and coyote are large predators inhabiting the study area.

The size of the mountain lion population is unknown but numbers are suspected to be low even though they have been completely protected in California since 1971 and have had game animal status in Nevada since 1965. Most of the study area is marginal habitat, lacking rugged escarpments, rocks, or trees used as stalking cover by mountain lions in pursuit of deer.

Bobcat populations are currently low caused by low jackrabbit populations, a major prey species, and more intensified efforts by trappers. Wall Canyon, Cottonwood Creek, Lost Creek and the canyons in the Tuledad Allotment supply the rocky washes, canyons, cliffs, thickets, and brushy draws used by bobcats.

Coyotes are the most abundant large predator and occur in all habitat types. Coyotes are largely dependent on small mammals for prey but also take large herbivores, including livestock. Coyote populations are unknown.

Sage Grouse

Sage grouse inhabit most of the area except Duck Flat and the white fir forests in Tuledad Allotment. Approximately 5,800 birds inhabit the Nevada portion of the study area (Nev. Dept. of Fish and Game, 1975) and expansion of these data to the California portion of the study area would bring total estimated numbers to nearly 6,700 birds.

There are four important sage grouse habitat components: strutting grounds, nesting areas, brooding areas, and wintering areas. Locations of the first three are depicted on MAP 2-11. Sage grouse habitat has not been fully inventoried, so complete site documentation is not possible.

Strutting grounds are important in the reproductive cycle and are vulnerable to disturbance. Open sites with low-growing vegetation provide strutting habitat.

Nesting habitat for sage grouse occurs in abundance in HT-5, 6, 7, 14, 16, 17, 18, 19, 20, and 21. Approximately 60 percent of nesting usually occurs within two miles of strutting grounds (Western States Sage Grouse Committee, 1974). In a study by Wallestad (1974), 31 successful nests of 41 monitored had a sagebrush canopy coverage averaging 27 percent with a residual grass and forb understory. TABLE 2-26 shows that the habitat types in this study area contain far less canopy coverage of sagebrush than that in Wallenstad's study but the amount of litter present appears satisfactory. The effects of the nesting cover in the study area on the sage grouse population is unknown.

Brooding areas are sites where hens raise chicks to maturity. Sage grouse chicks require succulent, high-protein forb diets provided by wet meadows and riparian areas. These occur in HT-13 and 27 and are in poor condition. Livestock use on these areas has reduced plant density and maintained the vegetation in a closely cropped state, leaving little food and cover. Habitat types 13 and 27 have been invaded by shrub species and many sites formerly covered by meadow and riparian vegetation no longer exist.

Wintering areas consist of slopes or ridge tops blown free of snow or expansive areas with little slope where canopy coverage of sagebrush exceeds 20 percent (Eng and Schladweiler, 1972). These areas provide winter forage.

Chukar

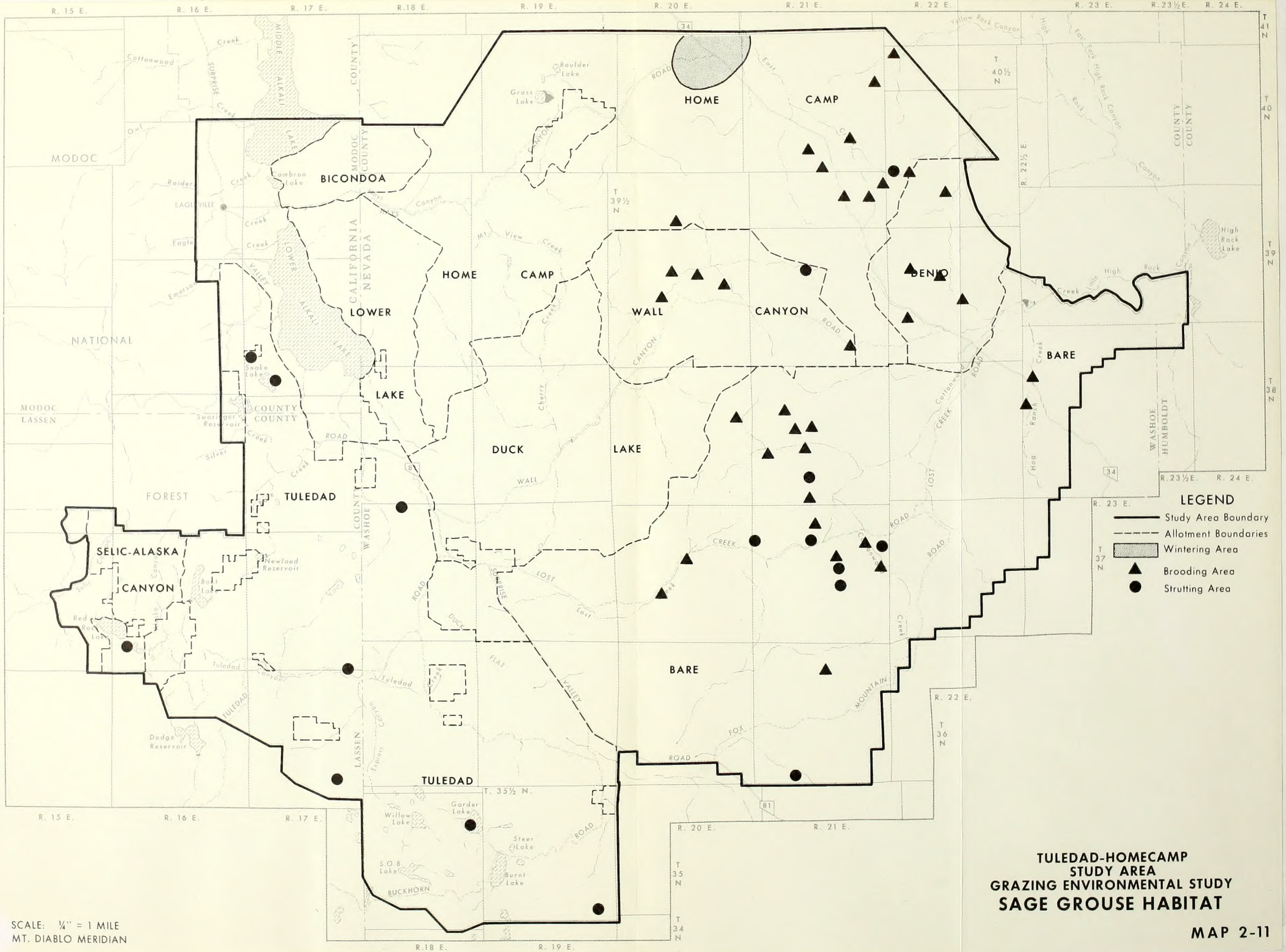
The chukar partridge is considered the number one game bird in Nevada (Christensen, 1970). It is also an important game bird on the California portion of the area. Birds were introduced in the late 1930s and current populations estimated at 4,500 birds (Nev. Dept. Fish and Game, 1975) in the

TABLE 2-26

SAGE GROUSE NESTING COVER

	Habitat Type									
	5	6	7	14	16	17	18	19	20	21
% canopy coverage of sagebrush 1/	14.9	12.6	18.6	18.6	7.4	13.5	8.2	17.2	15.6	11.1
% canopy coverage of litter 1/	26	26	46.5	12.6	27	24	27.9	49.5	20.5	11.8

1/ From Appendix F.



SCALE: ¼" = 1 MILE
MT. DIABLO MERIDIAN

TULEDAD-HOMECAMP
STUDY AREA
GRAZING ENVIRONMENTAL STUDY
SAGE GROUSE HABITAT

MAP 2-11

Nevada portion of the area; extrapolating these densities to California indicates 912 birds for a total of 5,412 in the study area. Bird populations fluctuate widely due to variable weather conditions. According to Christensen (1970), continuous ground cover of snow for sustained periods reduces chukar survival. Wet weather during May and June can cause high chick mortality and dry fall and winter periods can cause a green cheatgrass shortage that causes poor nesting success.

Cheatgrass is the most important food for chukars and shows up in the diet every month as green leaves or seeds. Heaviest dependence is November through March when cheatgrass makes up most of the diet (Christensen, 1952, from Christensen, 1970). Other annual and perennial grasses and forbs, as well as insects, show up in the diet.

Chukar can use snow or succulent vegetation to satisfy their water requirement during part of the year but during summer water is the primary habitat component of concern to the population.

Scattered rocks, shrubs, and grasses supply the cover needs of chukar. Chukar prefer areas with rocky outcrops and steep talus slopes for escape cover. They often roost in such areas.

Habitat conditions for chukar are good and the trend appears stable (U.S. Dept. Int., BLM, 1976e). Occupied habitat areas are shown on MAP 2-12. Dense concentrations of birds occur in Lost Creek, Wall Canyon, Boardwell Creek, and Denio Allotment areas.

California and Mountain Quail

California quail occur in 23 areas as shown in MAP 2-12; mountain quail have been observed only on Fox Mountain in the Bare Allotment. Quail are abundant around cultivated land near Eagleville. Populations are isolated because of the limited habitat. Numbers appear to be down but actual population numbers are unknown.

Quail are commonly found in open, brushy rangeland but they are restricted to areas within about 300 yards of water (Edminister, 1954). Only HT-27 (willow/Nevada bluebunch) in the study area meets their needs for shrub cover and water. Quail habitat is currently in poor condition. Livestock concentrate in areas near water and, through their feeding and rubbing habits, destroy young trees and shrubs that would provide quail habitat.

Quail depend on grass leaves and weed seeds for a major part of their diet. To a minor degree, they utilize fruits and insects.

Livestock compete with quail for food on the willow/Nevada bluegrass habitat type. Livestock are attracted to the lush forage areas near water and remain there throughout the grazing season.

Weather conditions also act as limiting factors on quail populations of the area. Both drought and heavy snows (described in Chapter 2, Climate) serve to lower quail numbers.

Mourning Dove

Dove inhabit the entire area except timber stands and marshes, though they prefer lower areas and valley bottoms. Dove numbers are unknown but many nest in the area and some are harvested here. Weather factors and nest destruction by predators have a strong influence on annual production.

Dove habitat is in good condition. Annual forbs, which produce the seeds making up the bulk of the dove's diet, are plentiful. Adequate nesting habitat is available. The birds nest in shrubs, trees, and on the ground. They inhabit the area from April until early September.

Water is often the limiting factor of dove habitat in arid areas but their wide-ranging abilities allow them to travel up to 12 miles for water (Gubanich, 1966).

Waterfowl

Aerial surveys conducted by the California Department of Fish and Game indicate that 16 species of ducks, Canada and snow geese, and whistling swans utilize wetland habitat in the study area. Nesting by Canada geese, mallards, pintails, gadwalls, cinnamon teal, ruddies, and redheads is common. On Red Rock Lake, from 1949-1975 an average of 39 Canada geese and 20 pairs of ducks were counted. Boot Lake, in the Tuledad Allotment, had an average of 36 geese and 13 pairs of ducks during the same period. These areas represent the best waterfowl habitat in the study area. Other areas of like habitat are assumed to have an equal or lesser degree of waterfowl use.

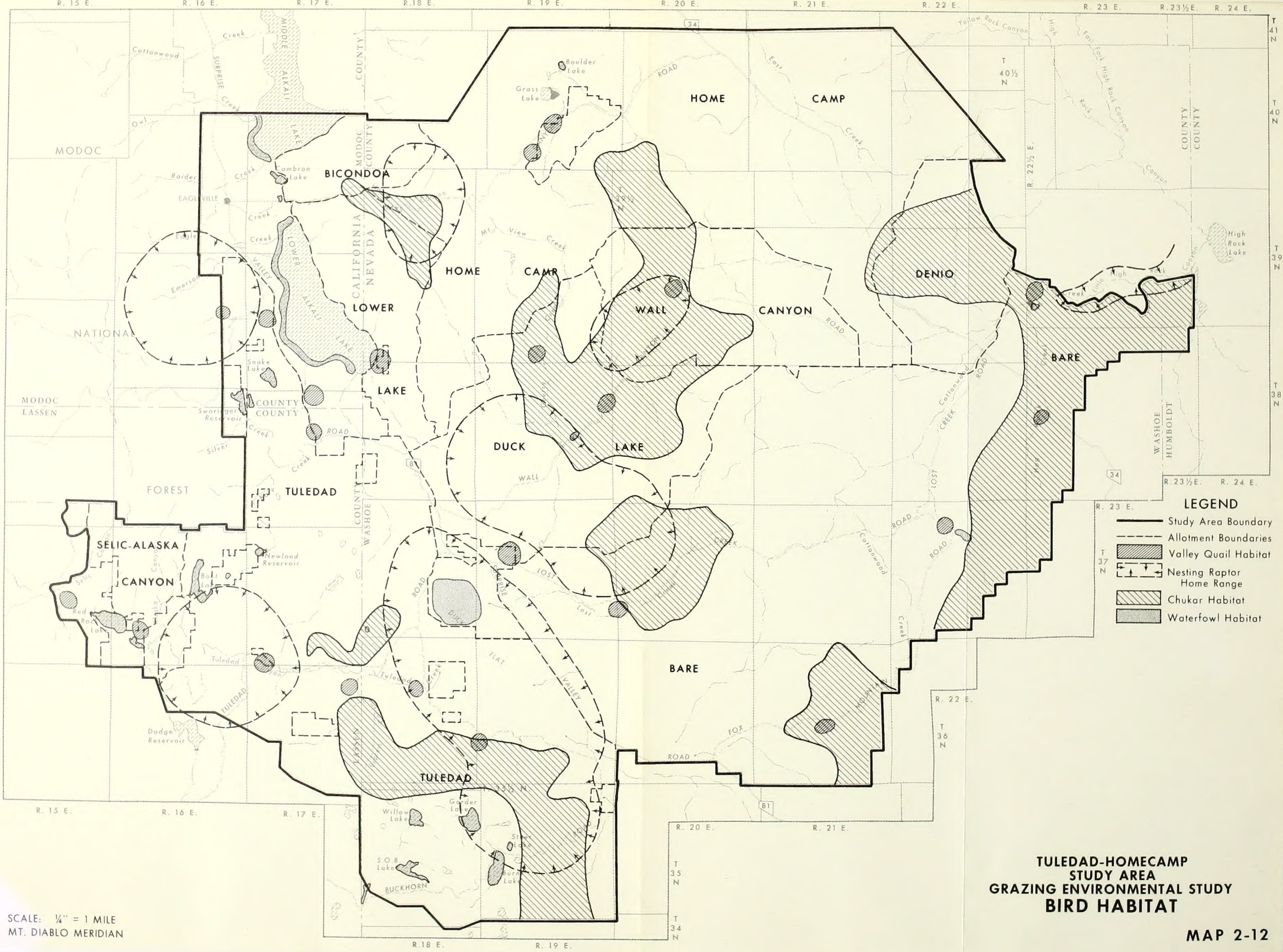
No accurate annual estimates of use by migrating waterfowl in spring or fall are available. Counts conducted on November 19, 1976, found waterfowl present, as shown in TABLE 2-27.

Waterfowl habitat consists of only .5 percent of the lands in the study area. Playas (HT-23), man-made lakes, natural lakes, marshes, and streams

TABLE 2-27
WATERFOWL CENSUS WATERBODIES IN THE TULEDAD/HOME CAMP AREA, NOVEMBER 19, 1976

Species	Location Cambron Lake	 Newlands Reservoir	 Boot[1] Lake
Whistling swan	62	1	
Canada goose			30
Mallard	122	7	239
Pintail	44	30	460
Widgeon	3	43	575
Cinnamon teal	1	22	
Greenwing teal	3		13
Redhead		8	
Canvasback	31	14	51
Bufflehead	1	28	19
Lesser scaup	2		
Golden eye	4	9	
Ruddy duck		42	

[1] The Boot Lake tally was not a complete census due to its extensive size and waterfowl movements. The tally is, however, representative of the waterfowl population structure on Boot Lake.



TULEDAD-HOMECAMP
STUDY AREA
GRAZING ENVIRONMENTAL STUDY
BIRD HABITAT

SCALE: ¼" = 1 MILE
MT. DIABLO MERIDIAN

MAP 2-12

(HT-27) provide 2,400 acres of habitat. There are 2,000 acres of potentially high-quality habitat and 400 acres of low-quality habitat. Waterfowl habitat distribution is shown on MAP 2-12. This habitat was classified using standard type classifications from U.S. Fish and Wildlife Service Circular 39 (Shaw and Fredine, 1971). Two wetland types were found:

(1) Inland open freshwater (Type 5) wetlands include Boot Lake, Boulder Reservoir, and numerous shallow stock ponds. These reservoirs and ponds would normally be fringed by emergent vegetation and are usually less than 10 feet deep. Type 5 areas are used extensively as brood areas and as feeding areas by ducks, geese, and coots during migration. A total of 1,400 acres of this type occurs in the study area.

(2) Inland saline marshes (Type 10), which are in HT-23, are found at SOB, Garden, Willow, Steer, and Burnt Lakes. A total of 1,380 acres of this type of wetland exists in the study area, occurring as intermittent shallow lake basins. These areas, when flooded, are used for nesting and feeding by ducks and geese.

Current condition of habitat is poor for waterfowl nesting because livestock heavily graze shoreline and upland vegetation during the entire grazing season from April through October (Swickard, 1977). The value of such vegetation to nesting waterfowl has been documented by many authors (Bue, et al., 1952; Shearer, 1960; Uhlig, 1963; and Keith, 1961). Mundinger (1976) demonstrated an inverse relationship between the attractiveness of an area to waterfowl and the amount of forage removed by livestock. He found that waterfowl selected reservoirs for nesting where greater shoreline vegetation occurred.

NONGAME SPECIES

Of the species of mammals, birds, reptiles, and amphibians common to the Great Basin biome, 305 occur in the study area.

Some of the more common small mammals include shrews, moles, bats, ground squirrels, chipmunks, pocket gophers, pocket mice, kangaroo rats, mice, wood rats, and voles. Large rodents found in the study area include beaver, muskrats, and porcupines. Predatory mammals that are seldom seen but are nevertheless resident include coyotes, foxes, raccoons, ringtail cats, weasels, mink, badgers, skunks, bobcats, and mountain lions.

Varieties of birds are well-represented in the study area and some of the common nongame groups include grebes, herons, bitterns, hawks, owls, eagles, crows, jays, chickadees, nuthatches, wrens, thrashers, thrushes, woodpeckers, flycatchers, swallows, and song birds.

Insects, mollusks, and crustaceans are known to inhabitat the study area but no checklists are available.

The study area is able to support the wide diversity of animal species because of the interspersed pattern of succulent forage, tree or tall shrub cover, and water, very important in the dry, low shrub lands of the study area. Habitat types 13 (Nevada bluegrass-sedge), 25 (curl-leaf mountain mahogany), 26 (aspen), and 27 (willow-riparian) are important to vertebrates because they provide habitat for such a large number of animals. TABLE 2-28 shows how many more species these habitat types support than HT-7 (big sage/Idaho fescue) which covers over 20 percent of the study area.

Habitat types 13 and 27 are generally in poor condition for most species. Heavy utilization by livestock leave little food and cover for insectivorous and herbivorous species. Habitat types 13 and 27 are being invaded by less desirable species and willows, important to many small birds, are declining. Habitat type 26 (aspen) is in poor condition and decadent trees are not being replaced. Aspen is also an important habitat component for many species of birds. Mountain mahogany stands appear to be in suitable condition to provide the form desirable for nongame species.

The sagebrush, shadscale, and greasewood habitat types generally have sparse understories of grasses and forbs, which is beneficial to some species, such as whiptail, zebratailed, sand, and leopard lizards, but is detrimental to some of the seed and insect-eating birds and mammals.

Steep canyons and rocky outcrops provide excellent nesting habitat for raptors, while expansive flat areas provide hunting and wintering habitat. Some localized areas (Duck Flat, Tuledad Canyon) within the study area have lower nesting densities than others due to low topography and the lack of rimrock. Prey populations fluctuate yearly and the raptors respond accordingly. Range conditions are apparently sufficient to support the prey base that this population is dependent upon as all species studied had a high reproductive suc-

TABLE 2-28
COMPARATIVE NUMBERS OF VERTEBRATES INHABITING FIVE HABITAT TYPES 1/

Habitat Type	Number of Species Supported by Habitat
7	48
13	113
25	152
26	152
27	87

1/ Data taken from field inventories available in Susanville District BLM office.

cess rate. Reproductive success and production levels seem normal compared with studies in Idaho (Kochert, 1972) and Montana (Reynolds, 1969).

During the spring of 1976, a preliminary investigation into the ecology of nesting raptors was conducted. Nest sites were identified by BLM and Nevada Department of Fish and Game personnel and productivity data were collected.

Reproductive and food habit data collected on nesting raptors are shown in TABLE 2-29.

THREATENED OR ENDANGERED SPECIES

The southern bald eagle is on both the U.S. Fish and Wildlife Service and State of California lists of endangered species. No nesting observations have been documented on the study area (Mallett and Oakleaf, pers. comm., 1976). However, occasional adults have been observed in Surprise Valley and Duck Flat.

The peregrine falcon is also listed as endangered. Historical nest sites exist in the Warner Mountains; however, there is no documentation of nesting activity in recent years (Mallette, pers. comm., 1976). Oakleaf (1977) stated that no nesting activity has been documented for this portion of Nevada but that certain areas have potential. No adults have been observed.

The California bighorn sheep has been declared rare by the California Fish and Game Commission pursuant to the California Species Preservation Act of 1970. While it does not currently inhabit the study area, its habitat occurs in the vicinity of Hays Canyon. The URA for the Tuledad/Home Camp Planning Units considers perennial grass forage the only habitat component in short supply in the area.

Aquatic Animals

There are seven perennial streams and two reservoirs in the study area with the capacity to support a fishery (TABLEs 2-30, 2-31). Historically, each stream was inhabited by cold-water game fish such as rainbow, Brown, eastern brook, or cutthroat trout. Today, these same waters support only remnant populations. Deteriorated habitat conditions have resulted in a general decline in the quality and quantity of trout cover, living space, spawning beds, and food production areas. The majority of these streams currently support populations of nongame species such as Lahonton speckled dace, Lahonton red-sided shiners, Tahoe suckers, Pit sculpins, pieute sculpins, and tui chubs. No rare or endangered species have been identified to date. Four of the seven streams have been stocked in the past. Wall Canyon Creek and Reservoir have been stocked with cold- as well as warm-water game species.

TULEDAD ALLOTMENT

The Tuledad Allotment contains four streams (24.5 total miles) and one reservoir which presently or historically have supported a cold-water fisheries. The BLM administers 8.5 miles (35 percent) of stream. The U.S. Forest Service administers 6.0 miles (24 percent). The remaining 10 miles (41 percent) is privately owned. Barber Creek, a fifth perennial stream, will be included in this analysis as a result of its high riparian values.

Portions of Bare Creek (0.75 mile), Silver Creek (2.0 miles), and North Creek (0.5 mile) are inaccessible due to topography and, therefore, remain unaffected by man's use of the area.

All of the streams flow in an easterly direction and terminate in Lower Alkali Lake. Silver Creek and North Creek are principal tributaries to Bare Creek.

Bare Creek

Bare Creek varies considerably in physical appearance along its 8-mile course. Upper Bare Creek, the designation given to 1.5 miles of public streamside, meanders placidly through clearings and juniper-sage-brush woodlands. The gradient is flat (1-1.5 percent) and the accessibility is good. The remaining 2.5 miles of public streamside are located 2.0 miles downstream. This turbulent stretch of stream is characterized by a long series of cascades, plunge pools, and riffles. The gradient is steep (2.5 to 10 percent) and the accessibility is poor. Both sections support rainbow and brown trout and have been stocked in the past years.

Waters from Newlands Reservoir continually feed Upper Bare Creek at a rate varying from 5.0 to 15 cubic feet per second (cfs). The stream averages 10 feet in width and ranges from 0.5 to 2.0 feet in depth. The condition of Upper Bare Creek is poor. Continual use along the stream has led to a decline in the steepness and stability of the banks and in the density and height of the bank cover. The reduction in the steepness of the banks has allowed the stream to assume a wider, shallower appearance which has led to a reduction in stream velocity, in increase in the surface area

TABLE 2-29

RAPTOR LIFE HISTORY DATA COLLECTED IN STUDY AREA, 1976

Species	Average Young per Occupied Nest	Predominant Nest Site	Primary Prey Species	Nest Pairs Identified
Golden Eagle	1.17	Cliffs	Rabbits	19
Red-tailed Hawk	3.00	Aspen	Beldings Ground Squirrel	10
Goshawk	1/	Aspen	1/	0
Prairie Falcon	2.67	Cliffs	1/	6

1/ No data available.

TABLE 2-30
FISHERIES STATUS OF STREAMS IN TULEDAD/HOME CAMP STUDY AREA

Stream	Allotment	Total Length (approx. miles)	Miles on Public Lands	Miles on Private Lands	Miles on NFS Lands	Source	Termination	Existing Use of Stream and Adjacent Lands	Existing Fisheries	History of Stocking	Existing Condition of Fisheries Habitat	Public Access
Bare Creek	Tuledad	8.0	4.0	4.0	0	Newland Spr. (private land)	Lower Alkali Lake	Heavy grazing, fishing pressure is light.	Rainbow & brown trout	Yes	(Upper) Poor (Lower) Fair	Good
Silver Creek	Tuledad	6.0	2.5	3.0	0.5	Modoc Nat'l. Forest	Bare Ck. Tributary	Grazing, fishing pressure is light.	Rainbow & brown trout	Yes	Good	Poor
North Creek	Tuledad	2.5	1.0	0.5	1.0	Modoc Nat'l. Forest (Lost Lake)	Bare Ck. Tributary	Grazing, fishing pressure is light.	Rainbow trout	Not Determined	Unknown	Very Poor
Barber Creek	Tuledad	5.0	2.5	0.5	2.0	Modoc Nat'l. Forest	Lower Alkali Lake	Heavy grazing, no fishing.	Unknown	Not Determined	Poor	Good
Emerson Creek	Tuledad	8.0	1.0	2.5	4.5	Modoc Nat'l. Forest (Emerson Lake)	Lower Alkali Lake	Heavy grazing, fishing pressure is light.	Rainbow & brown trout	Yes	Poor	Fair
Alaska Canyon Creek	Selic-Alaska Canyon	5.5	1.0	3.5	1.0	Modoc Nat'l. Forest (spring-fed)	Red Rock Valley Ck.	Grazing, fishing pressure is light.	Rainbow trout	Not Determined	Fair	Poor
Selic Canyon Creek	Selic-Alaska Canyon	7.0	1.0	4.0	2.0	Modoc Nat'l. Forest		Grazing, little or no fishing pressure.	Unknown	Yes	Poor	Fair
Wall Canyon Creek	Wall-Canyon/ Duck Lake	14.0	6.25	7.75	0	Springs T.39N., R.20E., Sec. 9	Lower Wall Canyon Res.	Heavy grazing, no fishing.	Tahoe sucker Speckled Dace Lahontan Redside	Yes	Poor	Good

TABLE 2-29

RAPTOR LIFE HISTORY DATA COLLECTED IN STUDY AREA, 1976

Species	Average Young per Occupied Nest	Predominant Nest Site	Primary Prey Species	Nest Pairs Identified
Golden Eagle	1.17	Cliffs	Rabbits	19
Red-tailed Hawk	3.00	Aspen	Beldings Ground Squirrel	10
Goshawk	1/	Aspen	1/	0
Prairie Falcon	2.67	Cliffs	1/	6

1/ No data available.

TABLE 2-31
FISHERIES STATUS OF RESERVOIRS IN TULEDAD/HOME CAMP STUDY AREA

Reservoir	Allotment	Total Surface (Acres)	Miles of Public Shore-line	Miles of Private Shore-line	Miles of NFS Shore-line	Source	Location	Existing Use of Stream and Adjacent Lands	Existing Fisheries	History of Stocking	Existing Condition of Fisheries Habitat	Public Access
Newland	Tuledad	80	0.65	0.60	0	Newland Springs via Bare Creek	T.37N., R.17E., Section 6	Storage for irrigation.	Rainbow & Speckled Dace	Yes	Fair	Good
Wall Canyon	Duck Lake	180	2.00	1.3	0	Wall Canyon Creek	T.38N., R.19E., Section 28	Storage for irrigation	Rainbow & brown trout, channel catfish, & small-mouth bass	Yes	Fair	Good

of stream exposed to the sun, and significant quantities of silt and organic muck collecting in pools and on the substrate. Aspens and willows, which historically lined the banks, have fallen. No regeneration or replacement has occurred. The lack of an overhead canopy combined with the absence of overhanging grasses and shrubs or undercut banks has resulted in water temperatures unfavorable for fisheries. Water temperatures ranged from 69° F to 74° F during a 10-day span in August and September, 1976. Farther downstream water temperatures increased. At a location 1.5 miles below the reservoir temperatures ranged from 1° F to 11° F higher than those upstream. The rubble and gravel bottom is obscured by high concentrations of suspended sediment and by the accumulation of silt and organic muck. Turbidity is estimated at less than 1.0 foot. Potentially good spawning beds and food production areas are buried. The most dominate water type is runs. The pool to riffle ratio is 20/80.

Juniper and sagebrush are encroaching on the streambed zone. Large amounts of bare soil are present within this zone.

An intervening private parcel, 2.0 miles long, separates Upper from Lower Bare Creek. Accessibility along this lower segment is impaired by steep talus slopes and dense riparian flora. The uppermost 0.75 mile of streamside has, for the most part, remained unchanged by man's activities. Livestock grazing is limited to the lower 1.5 miles of stream. Lower Bare Creek decends 700 feet in 1.75 miles. The gradient is steep and the character of the stream is dominated by cascades, plunge pools, and riffles. The channel is straight and confined.

Streambank vegetation consists primarily of waterbirch, birchleaf mountain mahogany, and chokecherry. The understory vegetation is lacking except where sufficient light is able to penetrate the dense canopy. The banks are bare but generally stable. The substrate consists of large amounts of bedrock, boulders, and rubble. Gravels are clean but cemented. The stream width averages 10 feet while depth ranges from 4 to 22 inches. Streamflow, bolstered by the input of North and Silver Creeks, is estimated at 15-20 cfs.

The combined effects of shade, tumbling water, and increased flow have greatly modified unfavorable water temperatures. An overall deficiency with respect to trout may be the lack of suitable cover and living space. Rainbow trout, however, were observed in plunge pools. A barrier to trout movement upstream exists in this segment. Fishery values progressively decline below this section of stream.

Silver Creek

Silver Creek contains the best trout habitat in the Tuledad/Home Camp Study Area. Poor accessibility has prevented any significant alteration of the stream by livestock. Rainbow and brown trout inhabit the 2.0 miles of stream under the jurisdiction of the BLM.

Silver Creek provides Bare Creek with a source of clean, highly oxygenated, cool water.

Silver Creek winds a path through a steep canyon lined with talus slopes, dense riparian vegetation, and accumulated slash. Accessibility is restricted to foot travel only. Along the upper 1.0 mile, streamside riparian growth is particularly dense. Waterbirch and birchleaf mountain mahogany form a dense canopy restricting light penetration and making access to the stream difficult. The average percent of streambank shaded exceeds 90 percent, prohibiting the development of ground cover and restricting the growth of aquatic vegetation. Stream width averages 8 feet. Streambank stability is good. Runs are particularly shallow along this portion of the stream (average 0.5 to 0.6 feet in depth). Pools are infrequent and range from 1.0 to 1.5 feet in depth. Rubble and gravel are predominant in this section of the stream.

There is considerable variation in streamside vegetation and streambed configuration along the lower 1.0 mile of stream. Extensive beaver damage along the upper portion has opened the dense canopy and allowed the establishment of grasses, rushes, and sedges. A meadow, 0.2 miles long, contains excellent habitat for resident trout. Livestock use is evident but not detrimental. Below this point the dense canopy is sporadic as is livestock access. Gradient increases significantly. Waterfalls range from 2 to 25 feet in height, preventing upstream migration of fish. Plunge pools appear below ledges and vary from 1 to 2 feet in depth. The bottom stratum takes on a more scoured appearance. Bank erosion is prominent where livestock access exists—particularly in the lower 0.25 mile of stream.

North Creek

North Creek is a principal tributary of Bare Creek; its input is estimated at 4.8 cfs. The stream's 1.0 mile of public streamside is partitioned into two 0.5-mile segments by an intervening private parcel. The downstream segment is accessible to livestock while the steep, rocky terrain and dense riparian vegetation of the upstream segment prohibit the free movement of cattle and sheep. Overall accessibility is poor. North Creek decends 800 feet in 2 miles. The gradient is steep and water velocity is generally sufficient to flush gravels and rubble free of accumulated silt and sediment. Streamside vegetation consists of juniper, sagebrush, turkey mullen, and various forbs. Riparian flora consists primarily of rushes and water-loving grasses and forbs. Shade (20 percent) is provided by sporadic stands of chokecherry and waterbirch. The upper banks reflect heavy livestock use. Stability is less than 50 percent. Average stream width is 7 feet and depth is 5 inches.

The stream is characterized by numerous steps varying from 1 to 4 feet in height. Pools range from 12 to 18 inches in depth. The pool to riffle ratio is 10/90.

The bottom fauna reflects generally clean water conditions. Caddis-flies and stoneflies are the chief inhabitants of the stream.

Emerson Creek

Emerson Creek historically supported a productive cold-water sport fishery. Annual and/or biannual plantings of rainbow, brown, or eastern brook trout were made from 1932 to 1965 to augment natural reproduction. All stocking was conducted by the California Department of Fish and Game. Recent records indicate that there have been no subsequent plantings in Emerson Creek. Present fishing pressure is light.

Emerson Creek flows at a rate of 10 cfs down a steeply banked ravine. The stream is characterized by a series of runs and riffles interspersed with numerous rockfalls 1 to 2 feet in height. Average stream width is 5.7 feet while depth is 5.5 inches. Plunge pools range from 8 to 24 inches in depth but are generally very short. Pool to riffle ratio is estimated at 10/90. The bottom consists of gravel and rubble maintained in a satisfactory condition by the cleansing action of the stream.

Steep banks and low-density ground cover make the stream highly susceptible to accelerated erosion and siltation. The lower banks benefit somewhat from dense root revetments which allow some undercutting but overall bank stability is less than 50 percent.

Aspen, willow, and waterbirch abound, particularly in the upper reaches of the stream. Average stream area shaded was estimated to be 75 percent in the upper segment and 63 percent in the lower segments.

The bottom fauna is comprised of caddisfly larvae and stonefly nymphs (indicators of good water quality), but abundance was found to be low.

Barber Creek

Barber Creek is a small mountain stream which lacks sufficient size, depth, and rate of flow to support a productive fishery. The average width is 3.25 feet, depth is 2.0 inches, and rate of flow is 1.2 cfs. There are no records pertaining to species composition or abundance of fish in these waters.

The value of the stream lies in its ability to support a diverse riparian flora. Aspen, willow, waterbirch, and birchleaf mountain mahogany abound along the stream's edge. The north and south forks are particularly dense. Below their confluence the riparian flora is giving way to the encroachment of juniper, sagebrush, turkey mullen, and rumex. Heavy utilization of this area has reduced the density of the ground cover and has seriously hampered the regeneration of aspen seedlings.

Newland Reservoir

Newland Reservoir, 80 surface acres, has a maximum storage capacity of 400 acre-feet. Its source is Newland Springs (a privately owned perennial spring) via Bare Creek. Waters enter the reservoir at a rate of approximately 3-4 cfs. The temperature of the incoming water was measured at 59° F during late August 1976. The waters in the reservoir near the source were 10 degrees warmer. There are no data pertaining to depth and temperature gradients in the impoundment.

Newland Reservoir is 66 percent privately owned. All waters in and above the reservoir have been appropriated by private individuals.

The reservoir historically supported rainbow trout and speckled dace. More recent information is lacking.

SELIC-ALASKA CANYON ALLOTMENT

Two perennial streams in the allotment—Selic Canyon Creek and Alaska Canyon Creek—presently support rainbow trout. Both streams originate in the Warner Mountains on the Modoc National Forest and flow southward through the allotment toward their termination in Cedar and Red Rock Valley Creeks, respectively. The BLM administers 2.0 miles (16 percent), U.S. Forest Service administers 3.0 miles (24 percent), and the remaining 7.5 miles are privately owned. Both streams are greatly segmented by private intervening lands. The two streams rely heavily on perennial springs as their chief source of water.

Selic Canyon Creek

Selic Canyon Creek is a small mountain stream with limited capacity for supporting cold-water sport fishing. The stream averages 5.5 feet in width and 3.5 inches in depth; flow is estimated at 1.0 to 2.0 cfs. The stream's natural character provides little habitat for trout. Shallow runs and riffles dominate the profile while plunge pools are generally shallow and short. Beaver ponds provide the bulk of the suitable living space in the stream. The gravel bottom is fairly clean and provides spawning habitat for resident as well as migrating rainbow trout from Cedar Creek. Fines accumulate in ponds and sidewaters.

Bank stability is estimated at 50 percent. Cover consists primarily of rushes and sedges with intermittent stands of willow (3 to 15 feet high) and gooseberry. Aspen and willow growth has been severely set back by beaver abuse. The average stream area shaded is currently estimated at 40 percent.

Selic Canyon Creek is divided into small isolated segments of public land (1.0 mile) by private intervening lands. Accessibility along these segments is fair.

Alaska Canyon Creek

Alaska Canyon Creek is a typical mountain stream exhibiting a gradual decline in gradient, water velocity, and size of substrate from its upper to its lower stream course. The three segments of public lands are located in the middle stream course which is isolated, remote, and inaccessible to motorized travel. Coarse bottom materials comprise the central channel while lighter materials (silt and fines) settle out in the pools and sidewaters. The stream contains a series of descending steeps with short, shallow pools occurring below each cascade. Pool to riffle ratio is 20/20. The principal pool area has been produced by beaver damming in three areas. These backwaters range from 12 to 22 inches deep and from 10 to 15 square yards in diameter. Numerous rainbow trout were observed in these pools.

The average width of the stream is 11.25 feet and depth is 5.5 inches. The rate of flow is estimated at 3-7 cfs. Bank stability is less than 50 percent—steep earthen banks account for the majority of the instability. Bank cover consists of rushes, sedges, and grasses. The ground cover is low and provides little stream cover. Willows and aspen account for the moderate amount (60 percent) of shade found along the stream. Turbidity is classified as murky with visibility limited to 1 to 2 feet in depth.

Quaking Aspen Creek, an intermittent stream of similar character, provides seasonal input to Alaska Canyon Creek.

WALL CANYON AND DUCK LAKE ALLOTMENTS

Wall Canyon Creek is 14 miles in total length and is located entirely in Nevada. Approximately 8 miles of stream are located in the Wall Canyon Allotment; 6 miles are in the Duck Lake Allotment. The BLM administers 6.25 miles of the stream (45 percent) while the remaining 7.75 miles are privately owned. The Wall Canyon Allotment contains 3.25 miles of public streamside and the Duck Lake Allotment contains 3.0 miles. The entire stream area is accessible to livestock use. Wall Canyon Reservoir is located in the Duck Lake Allotment. All of the shoreline can be grazed.

Wall Canyon Creek

Wall Canyon Creek contains 6.25 miles of public streamside. It is divided into segments of 3.0 miles, 0.75 mile, 0.50 mile, and 0.25 mile by separated intervening private lands. Extremely high water temperatures preclude the establishment of a cold-water sprot fishery. Lahonton redsided shiners, Tahoe suckers, and speckled dace inhabit these waters.

The overall condition of Wall Canyon Creek is poor. High water temperatures (80° F plus) reflect the lack of shade (less than 5 percent stream area shaded), the inadequate rate of flow (2.0 cfs), and the high amount of silts and suspended sediments. Steep, earthen banks (4-7 feet high) contribute considerable amounts of soil and debris. This soil inundates the gravel and rubble bottoms and collects in pools and backwaters and along the periphery of the stream. Aquatic vegetation and algae are abundant.

The average width and depth of the stream are 10 feet and 5.5 inches, respectively. Pools and riffles are present at a rate of approximately 10/90. The stream gains its water primarily from perennial springs located at the headwaters (T39N., R20E., Section 9) and along the stream course. Wall Canyon Reservoir is situated 6 miles downstream. The reservoir drastically impedes the rate of flow below this point. Waters enter the impoundment at a rate of 4 cfs and departs at approximately 1.5 cfs, primarily as seepage from the dam.

The stream provides spawning beds for the trout in the reservoir. Caddisflies, stoneflies, dragonflies, leeches, and snails occur in the stream.

Wall Canyon Reservoir

Wall Canyon Reservoir, 180 surface acres, has a maximum storage capacity of 3,800 acre-feet. Approximately 2.0 miles of the shoreline are public, the remaining 1.3 miles are privately owned. The primary purpose of the reservoir is storage of irrigation water.

The Nevada Department of Fish and Game planted the reservoir with cutthroat trout and kokanee salmon (1965-68) in an attempt to establish a viable population. Both, however, have failed primarily as a result of unfavorable water temperatures both in the reservoir and in the source stream (Wall Canyon Creek). Brown trout and rainbow trout were stocked in 1968 and 1972 respectively with fair success. In 1974 smallmouth bass were released into the reservoir. No reports of their success exist. Nongame species include the Tahoe sucker, Lahonton red-sided shiners, and speckled dace. Angler use is reported to exceed 5,000 use-days annually. Accessibility is good.

WILD HORSES

Two herd management areas are established within the Tuledad/Home Camp Study Area; MAP 2-13 shows the Tuledad and the Fox-Hog Mountain Herd Management Areas as well as the locations of the horses during the 1973-75 inventories. Information concerning these areas was taken from the Tuledad/Home Camp Unit Resource Analysis (1976) and the Susanville District Wild Horse and Burro Management Plan (1976).

Tuledad Herd Management Area

The Tuledad Herd Management Area, 158,000 acres, lies 30-40 miles south of Cedarville, California. Terrain is rough and steep with extensive tablelands and lava outcroppings. Elevations range from 5,500 to 8,000 feet. Water is abundant. Significant amounts of snow (1.5 feet +) fall on 50 percent of the area during winter. Over half of the lands are inaccessible by vehicles; only two main roads traverse the area.

Vegetation is generally juniper-big sage on the north and west portions and low and big sage in the southeastern portion of the area.

The horses in the Tuledad Herd Management Area are divided into two groups, those that occupy the Coppersmith Hills region and those in the area south of Tuledad Canyon and east of Cottonwood Mountain. Tuledad Canyon represents a natural barrier. There is little, if any, interchange between the two groups. Six inventories, carried out by helicopter, have been conducted since 1973 (TABLE 2-32). The inventories represent horses counted; the average rate of increase (22.9 percent for three years) indicates a healthy horse population and good animal condition.

TABLE 2-33 gives the percentages and acreages of habitat types utilized by the two groups of horses based on their locations during the February/August 1975 inventories. As shown, the Coppersmith horses' area of winter use is entirely in the low sage/Idaho fescue (HT-17) and big sage/bluebunch wheatgrass (HT-20) habitat types. Their summer range covers five habitat types, with about 90 percent of it in the low sage/Idaho fescue (HT-17) and big sage/Idaho fescue (HT-7) types. The horses' area of winter use south of Tuledad Canyon was found to be in three habitat types, with approximately 90 percent of the use in the low sage/Idaho fescue (HT-17) and big sage/Idaho fescue (HT-7) types. Summer use by this group occurred in five habitat types, with 93 percent of the use in the big sage/Idaho fescue (HT-7) and low sage/Idaho fescue (HT-17) types. The Nevada bluegrass/sedge (HT-13) and the baltic rush (HT-23) habitat types represent a very small percentage of the total area used by horses but are very heavily utilized. These types represent the wet meadow areas and lakebeds that are under water for a short period in the spring.

TABLE 2-32
WILD HORSE INVENTORIES FOR TULEDAD HERD MANAGEMENT AREA

	Feb. 1973	Aug. 1973	Aug. 1974	Feb. 1975	Aug. 1975	Feb. 1976
Adults	193	147	187	192	231	266
Young[1/]	29	32	41	31	56	74
TOTAL	222	179	228	223	287	340
Herd Fluctuation[2/]	-	-43	+49	-5	+63	+51
Rate of Increase[3/]	-	21.7%	21.9%	-	24.2%	-
Number of Herds[4/]	39	18	32	30	43	55
Average Herd Size[5/]	6	10	7	7	7	6
Range in Herd Size[6/]	1 - 12	3 - 13	1 - 15	1 - 27	2 - 15	1 - 23

[1/] Young animals for August inventories are colts approximately 6 months of age and for February inventories are yearlings.

[2/] Represents increase or decrease in total herd size from previous inventory with differences due to natural increase or decrease of population, inventory error, or interchange between allotments.

[3/] Expressed as a percentage of colts to the adult population of horses.

[4/] Total of separate herds or bands of horses.

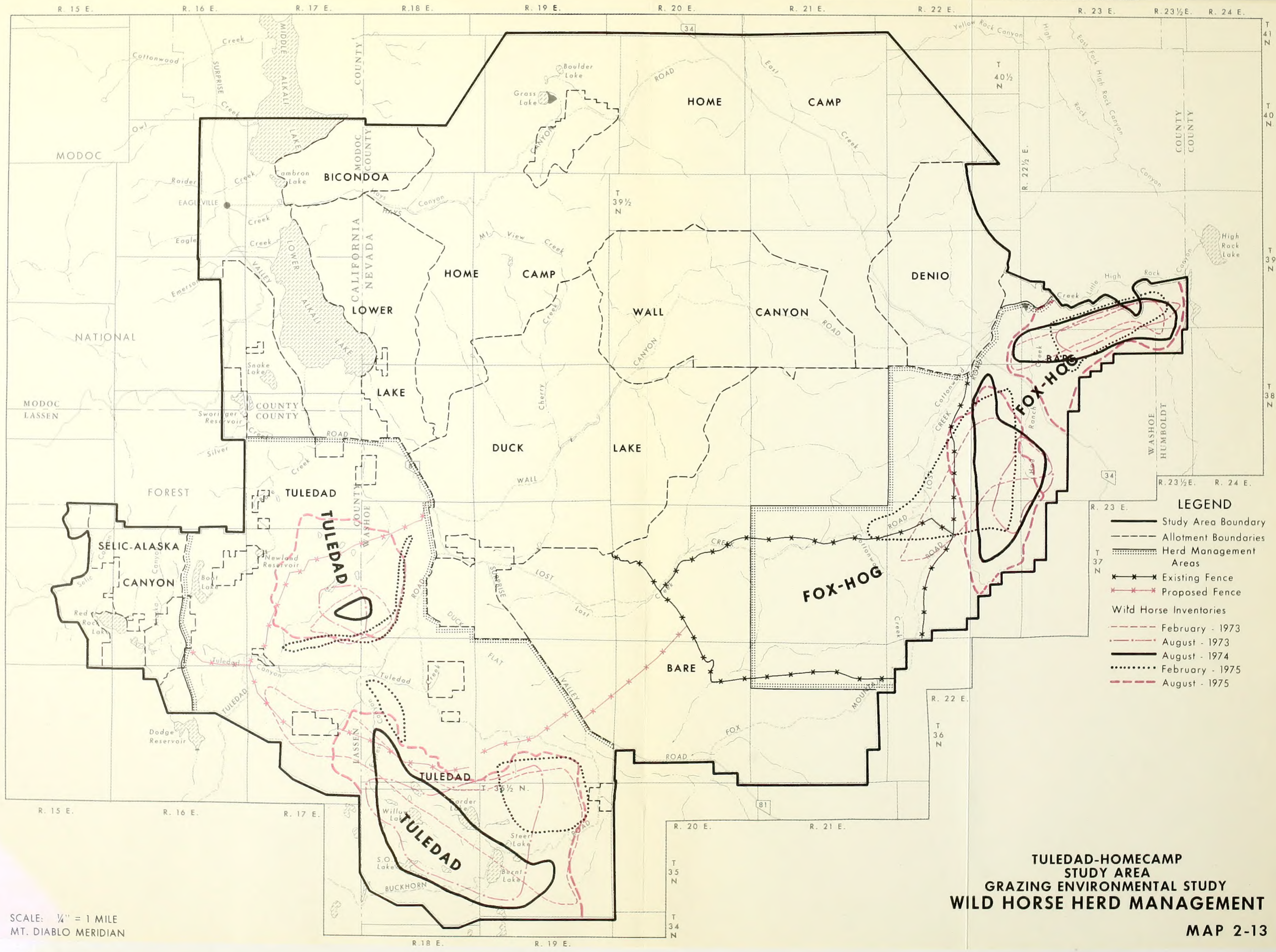
[5/] Determined by dividing total horses counted by total number of herds.

[6/] Smallest and largest herds inventoried, respectively.

Source: Susanville District Wild Horse Inventory Data, 1973 through 1976.

TABLE 2-33
HABITAT TYPES FOR TULEDAD UNIT HORSE USE AREAS

Habitat Type	Habitat Type No.	Present Range Condition	Acres	Percent of Total Acres
Coppersmith Horses - Winter 1975				
Low sage/Idaho fescue	17	Fair	360	33.3
Big sage/bluebunch wheatgrass	20	Fair	720	66.7
			1,080	
Coppersmith Horses - Summer 1975				
Low sage/Idaho fescue	17	Fair	8,320	61.5
Big sage/Idaho fescue	7	Fair	3,760	27.8
Big sage/bluebunch wheatgrass	20	Fair	880	6.5
Low sage/rabbitbrush	1	Fair	360	2.7
Nevada bluegrass/sedge	13	Fair	200	1.5
			13,520	
South of Tuledad Canyon Horses - Winter 1975				
Big sage/squirreltail-Indian ricegrass	6	Fair	680	11.3
Low sage/Idaho fescue	17	Fair	4,200	69.5
Big sage/Idaho fescue	7	Fair	1,160	19.2
			6,040	
South of Tuledad Canyon Horses - Summer 1975				
Big sage/Idaho fescue	7	Fair	16,000	47.7
Low sage/Idaho fescue	17	Fair	15,200	45.3
Low sage/rabbitbrush	1	Fair	1,320	3.9
Big sage/squirreltail-Indian ricegrass	6	Fair	680	2.0
Nevada bluegrass/sedge	13	Fair	320	1.0
			33,520	



TULEDAD-HOMECAMP
STUDY AREA
GRAZING ENVIRONMENTAL STUDY
WILD HORSE HERD MANAGEMENT

MAP 2-13

All of the habitat types are presently in fair range condition.

The Tuledad Herd Management Area boundaries are entirely fenced; however, most of the fence is located away from the horse use areas. Twenty-three miles of the southern boundary fence, which divides the Tuledad and Cal-Neva Planning Units from the Stone Cabin area in the east portion west to Cottonwood Mountain, is located in the horse use area. The fence, constructed in 1967, is in good condition. It is believed that there is little interchange between the horses of the two allotments.

Fox-Hog Mountain Herd Management Area

The Fox-Hog Mountain Herd Management Area, 94,080 acres, lies about 40-50 miles southeast of Cedarville, California (MAP 2-13). Terrain is rolling mountains with large expanses of plateau land. Elevations range from 5,300 to 8,000 feet, with the majority of the area in the 5,500- to 6,500-foot range. Water is found in springs, reservoirs, and three perennial streams. Snowfall depths range from 1.5 to 3 feet, but usually for short periods of time. The majority of the area is accessible by four-wheel drive vehicle. The area generally contains scattered patches of mountain mahogany and bitterbrush, with large areas of big and low sagebrush.

The results of the inventories for this area are shown in TABLE 2-34. The rate of increase over the past three years has averaged 21.1 percent, which reflects a healthy horse population and good animal condition.

The area was divided into habitat types and the results are listed in TABLE 2-35. Again, the percentages and acreages are based on the location of the horses during the February and August 1975 inventories. Almost 90 percent of the summer and winter ranges were in the big sage/squirreltail-Indian ricegrass (HT-6) and low sage/bluegrass-squirreltail (HT-21) habitat types and are in fair and excellent range condition, respectively.

The Fox-Hog Mountain Herd Management Area has been split by two fences, one that runs from near Fox Mountain north to another fence between the Denio and Bare Allotments and the other fence runs east and west through the upper northwest portion. The fences were completed in early summer of 1976, after the boundaries for the herd management area were established. Based on the August 1975 inventory and ground observations, all horses are located in the northeast portion of the herd management area on the east side of the fence that runs from Fox Mountain to the Denio Allotment. This area is called the Hog Mountain Pasture and covers 40,637 acres. All boundaries of the Hog Mountain Pasture are fenced except for approximately six miles along Little High Rock Canyon, which is the northern boundary of the pasture. There may be some interchange of horses between the area north of Little High Rock Canyon and the Hog Mountain area because the horses are able to cross the canyon in several places.

General Characteristics

Studies have not been conducted to determine sex or age ratios. Based on general observation, inbreeding does not appear to be a problem. Most foals are born during early spring, starting in March and continuing through April, May, and early June. Breeding takes place during spring and early summer.

The horses do not have specific summer and winter ranges other than normal expected movement from higher to lower elevations or to open, windswept ridges during periods of deep snow. It is during winter that forage variety and availability are most limited. The inventory of February 1975, when there was a deep snowpack over a large portion of the study area, indicated that in the Tuledad and Fox-Hog Mountain Herd Management Areas the horses used 85 percent and 40 percent less area than they used in the summer, respectively. This is in contrast to the February 1976 inventory, when there was virtually no snowpack, that indicated the horses used the same areas as they did during summer.

Daily movement is related to watering and feeding activities. Precipitation, wind, temperature, and sun have an influence on band location on any particular day. Horses use trees, if they are available, for shelter from snow and as shade.

Horses prefer to feed on grass or grass-like plants but will utilize shrubs during fall and winter. A yearlong fecal analysis study, started in July 1976, is currently being conducted on the two herd management areas. Fecal samples of horses, cattle, deer, and antelope are being collected monthly in several habitat types with analysis done at Colorado State University. The results, which will be available in late 1977, will help

TABLE 2-34
WILD HORSE INVENTORIES FOR FOX-HOG MOUNTAIN HERD MANAGEMENT AREA

	Feb. 1973	Aug. 1973	Aug. 1974	Feb. 1975	Aug. 1975	Feb. 1976
Adults	65	92	90	83	112	103
Young1/	22	20	19	24	23	32
TOTAL	87	112	109	107	135	135
Herd Fluctuation2/	-	+25	-3	-2	+28	0
Rate of Increase3/	-	21.7%	21.1%	-	20.5%	-
Number of Herds4/	17	16	19	18	22	21
Average Herd Size5/	5	7	6	7	6	6
Range in Size6/	1 - 15	1 - 11	1 - 18	3 - 10	1 - 12	1 - 11

1/ Young animals for August inventories are colts approximately 6 months of age and for February inventories are yearlings.

2/ Represents increase or decrease in total herd size from previous inventory with differences due to natural increase or decrease of population, inventory error, or interchange between allotments.

3/ Expressed as a percentage of colts to the adult population of horses.

4/ Total of separate herds or bands of horses.

5/ Determined by dividing total horses counted by total number of herds.

6/ Smallest and largest herds inventoried.

Source: Susanville District Wild Horse Inventory Data, 1973 through 1976.

TABLE 2-35
HABITAT TYPES FOR FOX-HOG MOUNTAIN UNIT HORSE USE AREAS

Habitat Type	Habitat Type No.	Present Range Condition	Acres	Percent of Total Acres
Summer 1975				
Big sage/squirreltail-Indian ricegrass	6	Fair	13,400	46.2
Low sage/bluegrass-squirreltail	21	Excellent	10,280	35.4
Big sage/Idaho fescue	7	Fair	5,320	18.3
			29,000	
Winter 1975				
Big sage/squirreltail-Indian ricegrass	6	Fair	8,800	51.6
Low sage/bluegrass-squirreltail	21	Excellent	6,440	37.8
Big sage/Idaho fescue	7	Fair	1,120	6.6
Big sage/Great Basin wildrye	5	Fair	680	4.0
			17,040	

determine habitat requirements, competition, and dietary overlap. Results for the first four months are completed and are shown in TABLE 2-36. These data show that horses prefer grasses during that time. Cattle and sheep also showed a preference for grass. The main grasses utilized by horses, cattle, and sheep were Idaho fescue, bluebunch wheatgrass, needle and thread grass, and carex. During this time period the study area received above-normal precipitation, which resulted in unusual "green up" of the grasses. This may have had an influence on the kind of forage utilized, especially for sheep. Horses and cattle had the highest average diet overlap (45-70 percent) for this period with sheep and horses showing low to moderate overlap and deer, antelope, and horses showing a very low diet overlap (TABLE 2-37).

Since horses and cattle subsist primarily on grasses, there is competition. However, actual competition is lessened by the fact that horses utilize higher, steeper, and rockier country and will also feed farther from water than cattle. Competition is greatest around water in meadow areas and stream bottoms.

Deer, antelope, and horses could have a dietary overlap at certain times of the year. Deer and horse grazing may conflict in the spring, when both species begin to forage on young green grass, and in the winter when both utilize browse. Antelope and horses may conflict in spring for young grasses and forbs.

Competition for space does not appear to be a problem even in winter when horses, deer, and antelope are found in concentrated numbers on snow-free ridges and tablelands.

Water is available throughout both herd management areas. This, plus the fact that horses can travel many miles to water, indicates that water sources are not a problem for horses in these two herd management areas. Currently, there is enough water available for horses, wildlife, and livestock and they utilize the same watering places.

VISUAL RESOURCES

Landscape Character

The entire area is rural in character. The Selic-Alaska Canyon-Boot Lake area and the High Rock Canyon complex (just east of the study area) have outstanding visual attributes.

At the southern end of the Warner Mountains and near the U.S. Forest Service's South Warner Wilderness Area, the subalpine nature of Selic and Alaska Canyons presents an area unique in respect to surrounding public lands. The area, with elevations up to 8,100 feet, contains numerous streams, scenic aspen groves and stands of white fir. This area has been designated for management as a scenic area.

The Little High Rock and High Rock Canyon complex is scenic with sheer vertical cliffs, roadless areas, and numerous historical and archaeological sites. The canyon complex has been submitted for nomination to the *National Register of Historic Places.* Management recommendations also include the possibility of Wilderness or Natural Area Designation (see GLOSSARY) or National Historic Monument status.

The steep canyon walls and high mountain peaks throughout the remainder of the area provide many scenic views.

The study area is not free of intrusions on the landscape character. The most prominent is the highrise powerline, which runs the length of the Home Camp Planning Unit portion of the study area. This line is paralleled by an access service road that scars the landscape.

Between Middle and Lower Alkali Lakes is the openair Calleville dump. Burning at this site is plainly visible.

The only developed communication site within the study area is on Fox Mountain. These facilities are not prominently seen from the main highways.

Numerous gravel pits are located along county and State roads. A mining area north of Indian Springs appears to have been abandoned, with numerous open pits and piles of overburden remaining. "Recreationists" in search of Indian artifacts and those removing illegal amounts of petrified wood have also left open pits.

Problems related to the condition of some spring-fed meadows in the study area have caused headcutting, lack of vegetal cover, and accumulations of fecal material around many of the springs.

Construction projects often present landscape intrusions, including some projects related to range management, such as fencelines, reservoirs, stock ponds, and cultural treatments.

TABLE 2-36

DIET COMPOSITION FOR HORSES, CATTLE, SHEEP, DEER, ANTELOPE FOR JULY THROUGH OCTOBER 1976

HORSES	Grasses %	Forbs %	Shrubs %
July	85-99	1-9	0-10
August	87-96	3-13	0-1
September	97-100	0-3	0-2
October	92-100	0-3	0-5
CATTLE			
July	65-99	0-15	0-31
August	78-98	1-8	1-18
September	30-99	0-43	0-26
October	78-99	1-17	1-10
SHEEP			
July	80	16	4
August	19-53	18-61	19-29
September	57	27	16
October	69-97	1-10	1-20
DEER			
July	19	2	79
August	0-1	2-8	91-97
September	0-1	1-4	95-99
October	1-7	1-4	88-99
ANTELOPE			
July	0-13	5-93	1-90
August	1-2	8-42	57-91
September	1-2	2-39	60-97
October	0-3	2-32	67-97

Source: Ongoing fecal analysis study being conducted in the Susanville District, BLM.

TABLE 2-37
AVERAGE DIET OVERLAP BETWEEN HORSES, CATTLE, SHEEP, DEER, AND ANTELOPE

Horses with =	Cattle (%)	Sheep (%)	Deer (%)	Antelope (%)
Coopersmith Hills Area	70	25	5	5
South Tuledad Area	45	30	5	5
Hog Mountain Area	65	-	5	5

Source: Ongoing fecal analysis study being conducted in the Susanville District, BLM.

Visual Resource Management

For the purpose of scenic quality analysis, the study area was divided into nine rating areas. Within each rating area, the landscape features and the aspects of color and uniqueness were evaluated. The South Warner area was rated as Class A scenery; Hays Canyon Range and Fox-Hog Mountains, Class B; all other areas, Class C (see MAP 2-14).

In the study area, VRM analysis resulted in the identification of Class II lands (the South Warners) and Class IV lands (the remainder of the area) (MAP 2-15). TABLE 2-38 shows the relationship of these classes to allotments.

APPENDIX G contains a more detailed description of the VRM analysis procedures. Refer to the Glossary for definitions of specific VRM terms.

CULTURAL RESOURCES

Archaeological Resources

INTRODUCTION

Archaeological resources consist of the physical traces of past human activity. Prehistoric archaeological resources, which are treated in this section, pertain to those periods before written history began to document events. In the Tuledad/Home Camp Study Area (as throughout most of the West), archaeological resources are the only sources of information on the several millenia of Native American occupation which transpired before white settlers (and the writers of historical documentation) came on the scene. The resources addressed here include all of the objects and places whose natural state was altered by human use or presence; they reflect, in varying degrees, the ideas, artifacts, and activities of the prehistoric cultures which authored them.

GENERAL

The Tuledad/Home Camp Study Area is a small, ecologically complex subsection of the Great Basin Cultural Area as defined by Kroeber (1939). Throughout the Great Basin aboriginal cultures in the historic period shared some fundamental similarities in technology, subsistence economy, and many aspects of social organization. Linguistic groups tended to be very large, and the distribution of certain items of material culture spanned vast distances.

The region was occupied largely by hunting and gathering bands whose subsistence focused on the seasonal exploitation of a great diversity of plant and animal foods. Populations shifted throughout the year in response to the shifting availability of foods, with the result that several microenvironments were visited in a seasonal round. Land use and settlement patterns were geographically extensive. Many groups were observed to follow this pattern in the historic period (Steward, 1938), and it has been inferred to have had a long tenure in the Great Basin (Jennings, 1964).

In certain favorable settings, lake margins offered food resources (especially marsh plants and waterfowl) the abundance and reliability of which allowed intensive exploitation, at times leading to relatively stable settlement patterns and much diminished seasonal movement. Lakeside orientation was observed for the Pyramid Lake Paiute in historic times (Loud and Harrington, 1929), and archaeological confirmation of the pattern has been forthcoming in recent years from several Great Basin locales (Bedwell, 1970; Heizer and Napton, 1970).

Ethnographic data collected in the historic period (Kelly, 1932) indicate that in the Tuledad/Home Camp Study Area the Surprise Valley Paiute (*Gidutikadu*), the only well-described Northern Paiute group inhabiting the study area, pursued a lifeway more like the first (extensive) pattern described above than like the second. While winter settlements consisted of nucleated villages on the valley floor, spring and summer saw at least a partial fractioning of group size, movement of some of the population to seasonal base camps, and exploitation of upland plant foods and game.

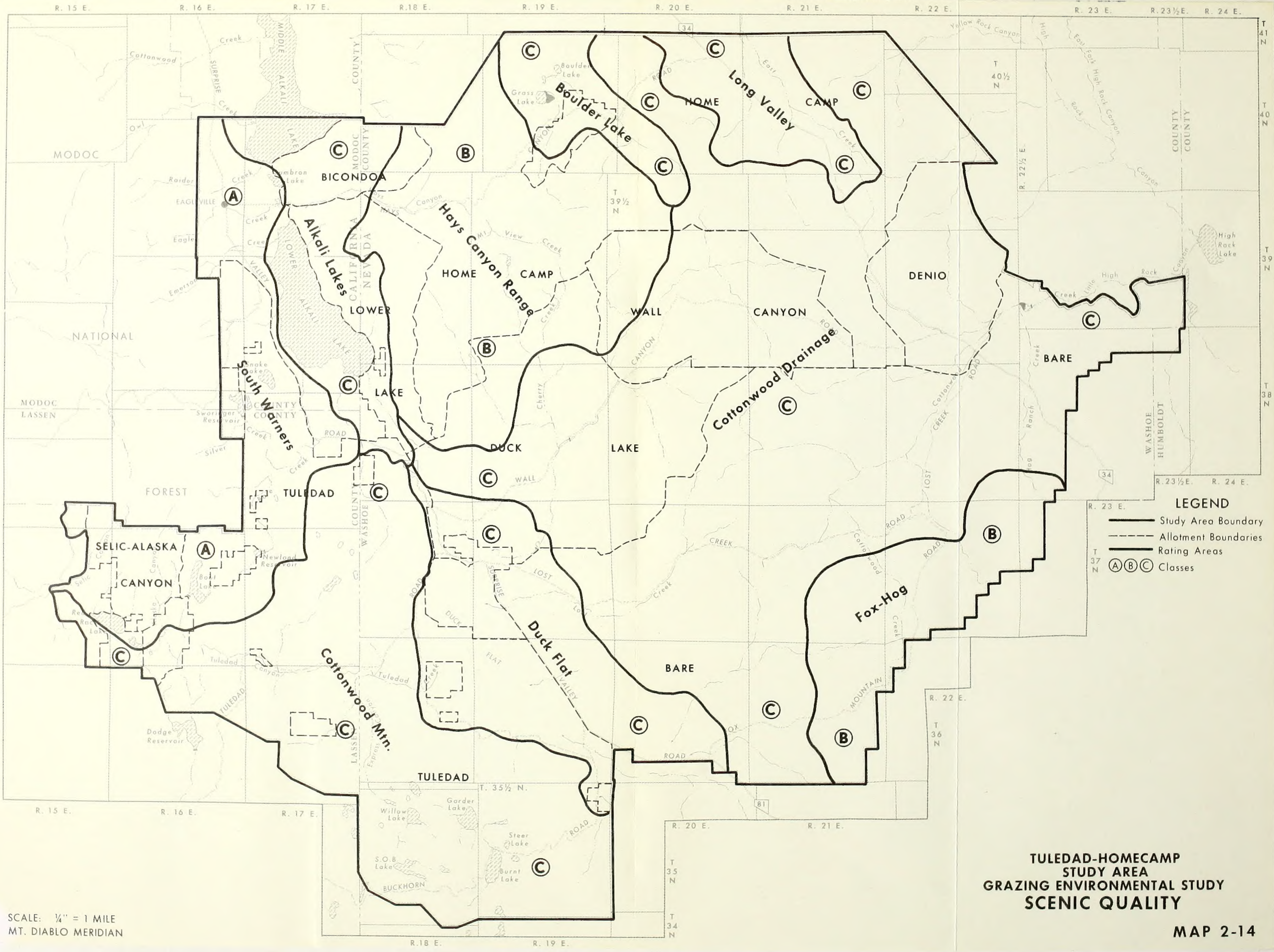
The eastern and southern portions of the study area were occupied in the historic period by the still very poorly known *Kamodokado* (Stewart, 1966), another subgroup of Northern Paiute whose lifeway, though not adequately documented, is inferred to have been comparable to the Surprise Valley pattern. Certainly the more arid climate and scarcer water sources would have been far less likely than the Surprise Valley lakes to support a semi-sedentary (Glossary) lacustrine subsistence.

Archaeological research performed so far in the area indicates that the ethnographically observed land-use pattern has had a relatively stable history over most of the period of human occupancy. O'Connell (1975) has specifically tested the endurance of the pattern in Surprise Valley through

TABLE 2-38

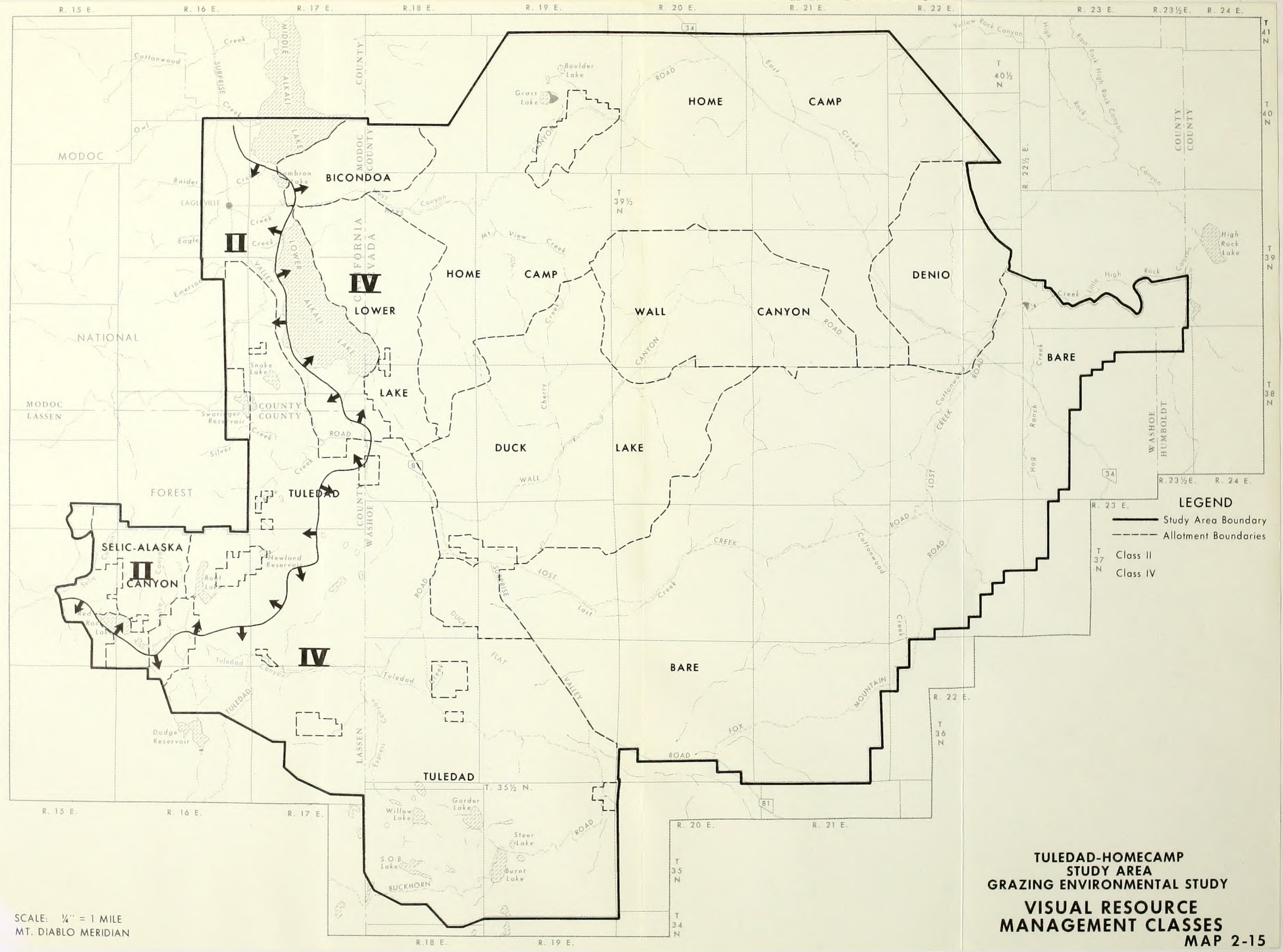
VISUAL RESOURCE MANAGEMENT CLASSES BY ALLOTMENT

	Visual Resource Management Classes	
Allotment	II	IV
Denio		X
Wall Canyon		X
Bare		X
Lower Lake		X
Duck Lake		X
Home Camp		X
Selic-Alaska Canyon	X	
Tuledad	X	



TULEDAD-HOMECAMP
STUDY AREA
GRAZING ENVIRONMENTAL STUDY
SCENIC QUALITY

MAP 2-14

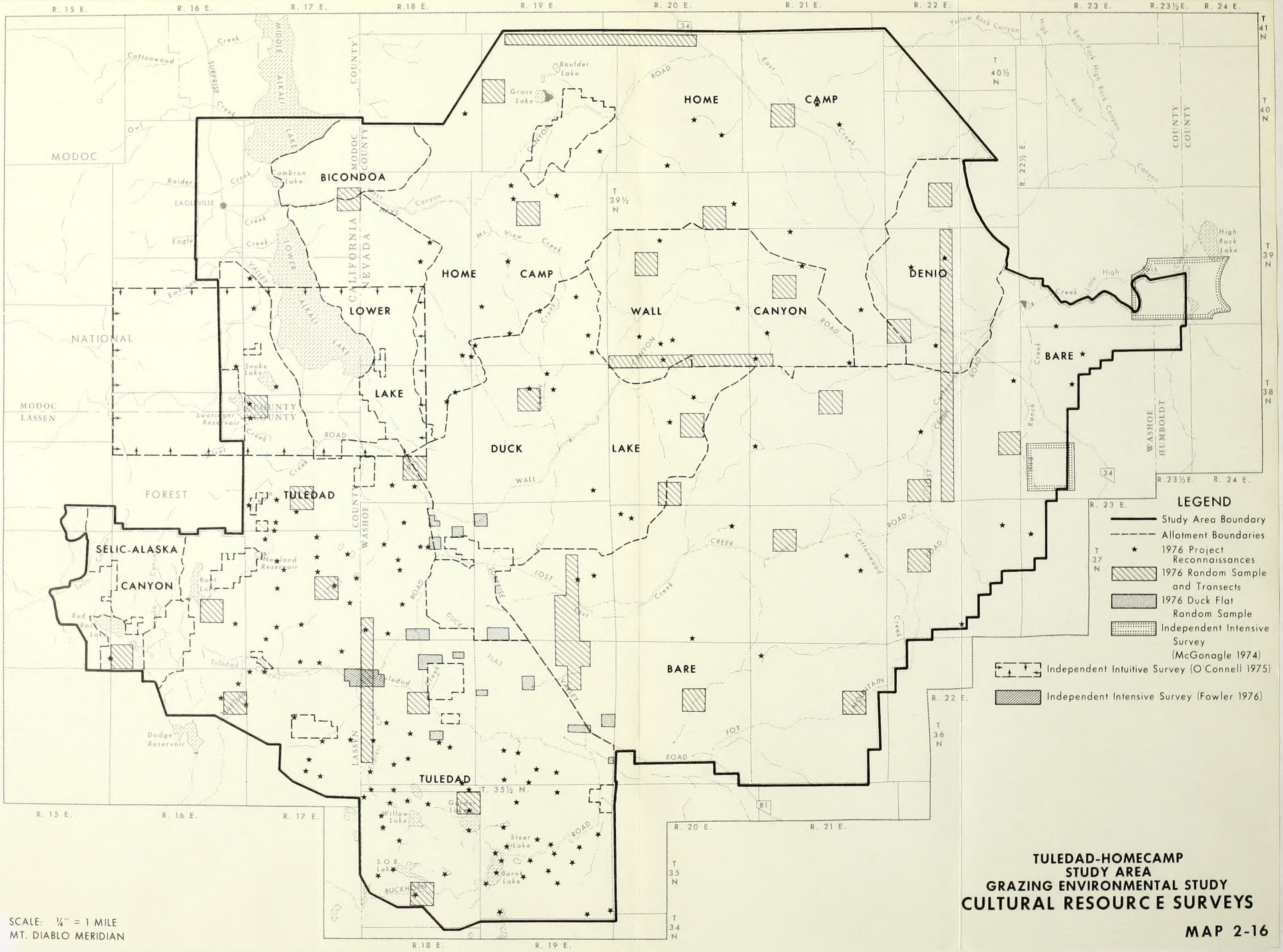


SCALE: ¼" = 1 MILE
MT. DIABLO MERIDIAN

TULEDAD-HOMECAMP
STUDY AREA
GRAZING ENVIRONMENTAL STUDY

VISUAL RESOURCE MANAGEMENT CLASSES

MAP 2-15



SCALE: ¼" = 1 MILE
MT. DIABLO MERIDIAN

**TULEDAD-HOMECAMP
STUDY AREA
GRAZING ENVIRONMENTAL STUDY**

CULTURAL RESOURCE SURVEYS

MAP 2-16

a program of excavations and site survey and concludes that only in the earliest defined prehistoric phase (4500-2000 B.C.; see Table 2-39) is there evidence of a pattern of social organization significantly different from that which characterizes the rest of the sequence. Large semisubterranean earth lodges, implying relatively large communal groups, are replaced at the end of the Menlo phase by smaller brush enclosures, indicating a major shift in the structure of human relationships (O'Connell and Ericson, 1974). The overall patterns of land use, settlement, and subsistence, however, undergo little change through subsequent millenia, and are not unlike the patterns of semipermanent winter villages and dispersed summer settlements observed historically in Surprise Valley. While unquestionably there were minor developments in the exploitation of specific plants and animals, some probably conditioned by climatic change, the basic adaptive strategy appears to have been remarkably stable over the past 6,500 years.

The spatial structure of the pattern is at present equivocal; O'Connell's survey did not locate major upland base camps in the Surprise Valley subsistence-settlement system, but this may be a deceit of the sampling strategy. The 1976 BLM survey may pose a revision to the inferred settlement structure with the discovery of base camps to 6,700 feet elevation throughout the study area. Independent surveys have shown, further, that the South Warners, adjacent to Surprise Valley, yield evidence of (unquestionably summer) plant exploitation to 8,000 feet (M. Boynton, Modoc National Forest, pers. comm., 1976).

In addition, the Surprise Valley sequence as it is currently understood does not reflect the total span of human occupancy of the Tuledad/Home Camp Study Area. Artifacts identified in archaeological survey and observed in private collections indicate a possible affiliation with the "Western Pluvial Lakes Tradition" of 9000-6000 B.C. (Bedwell, 1970; Hester, 1973), and research in immediately surrounding areas points to a much longer time depth than is apparent in Surprise Valley (Layton, 1970; McGonagle, 1974; Clewlow, 1968). Layton (1972), particularly, has advanced a sequence (based largely on the still poorly controlled obsidian hydration method of dating; see Glossary) which begins as early as 10,600 B.C. only 10 miles outside the study area.

As the Great Basin climatic regime has undergone demonstratable fluctuations since the end of the Pleistocene (Antevs, 1948; Davis and Elston, 1972), and since many of these fluctuations have no doubt significantly affected the productivity of local microenvironments (and therefore their suitability for human exploitation), the specific adaptive strategies played out in an area as large as the Tuledad/Home Camp Study Area must have undergone many modifications through time. These adjustments in human ecology and spatial patterning, however, can be reconstructed only through programs of archaeological research designed specifically to detect them. Such researches so far have not been performed in the study area outside of Surprise Valley.

SPECIFIC

At the initiation of the present study, knowledge of the content of archaeological sites in the Tuledad/Home Camp Study Area rested upon the excavation of two village sites in Surprise Valley, both with long sequences, domestic structures, and well-studied faunal sequences (O'Connell, 1971; O'Connell and Ambro, 1968), and one dry cave deposit (Brown, 1964). Knowledge of their spatial distribution rested upon two programs of archaeological survey:

(1) An eight-mile-wide transect spanned lower Surprise Valley from the crest of the Warners to the crest of the Hays Canyon Range (MAP 2-16). The survey was intuitive, focusing largely on water sources, and tested the incidence and constituency of sites in the chief present-day biotic communities of the area (O'Connell, 1975; O'Connell and Hayward, 1972).

(2) A controlled, intensive survey of two areas, comprising about 7.5 square miles, at the eastern periphery of the study area (an adjacent 5.5 square miles were also surveyed in the same effort; see MAP 2-16), was performed to test the incidence and constituency of sites in terms of their elevational zonation and proximity to water (McGonagle, 1974).

Both surveys indicated a very strong correlation between large, long-term occupation sites and the occurrence of reliable water sources, and both lead to the conclusion that exploitation of higher altitude zones consisted chiefly of seasonal hunting and the procurement of obsidian for artifact manufacture.

TABLE 2-39

PREHISTORIC CHRONOLOGY OF TULEDAD/HOME CAMP AND SURROUNDING REGIONS

Time	Archaeological Phases			
AD/BC	Surprise Valley (O'Connell, 1971)	Black Rock Desert (Clewlow, 1968; Cowan, 1972)	High Rock Country (Layton, 1970)	Warner Valley (Weide, 1968
1950	Bidwell	Late Prehistoric	Last Supper	Late Period
1000	Alkali	Rose Spring/Eastgate	Hanging Rock	
				Middle
0	Emerson			
			Smoky Creek	Period
1000				
	Bare Creek	Barrell		
2000				
		Springs	Silent	
3000				
	Menlo		Snake	Early
4000				
				Period
5000				
			Calico	.
6000				.
				.
7000	?			.
		Western Pluvial Lakes Tradition	Western Pluvial Lakes Tradition	.
8000				?
9000				
		'Earliest Times'		
10,000		?		

Source: Adapted from Hester, 1973.

Because these studies were localized, and only the McGonagle survey aimed at intensive coverage, they were judged not sufficient to characterize the distribution of archaeological sites over the area as a whole. As they could not predict adequately the location, frequency, or character of sites which might be impacted by the proposed grazing system, a program of additional reconnaissance was undertaken. To maximize the variety of information collected and to ensure its interpretive flexibility, multiple strategies were employed, including a stratified random sample of 18,560 acres and a series of half-mile-wide transects crossing major physiographic features (14,480 acres). Proposed spring and reservoir developments were also surveyed. By the end of the survey, a total of 4.65 percent of the study area (6.72 percent of public lands in the proposed grazing allotments) had been given archaeological scrutiny. APPENDIX H presents a fuller discussion of the survey methodology and its results.

Prior to 1976, a total of 41 archaeological sites in the Tuledad/Home Camp Study Area had been recorded in the files of the California and Nevada Archaeological Surveys. The 1976 program resulted in the identification and recordation of 389 previously unrecorded sites. Further, it allows their segregation into a number of distinct functional categories. Its probabilistic component (the stratified random sample) permits predictive statements on the frequency of occurrence of sites on the basis of environmental variables.

Characteristics of the site categories identified in the study area are as follows:

(1) Villages (Lowland Base Camps): Often large (5 acres +), always complex, sites located at lower elevations (generally below 5,000 feet) near reliable water sources, with multifunctional artifact assemblages (including chipped stone hunting, cutting, and scraping implements as well as ground-stone food preparation tools), and generally exhibiting surface features (especially exposed midden; see Glossary) indicative of vertical deposits.

(2) Upland Base Camps: Often large, complex sites, located at higher elevations near reliable water sources, which exhibit the multifunctional assemblages and often the indications of depth of deposit characteristic of villages, but which are generally smaller in size and less abundant in cultural materials.

(3) Temporary Camps: Small or large sites, located in all environmental settings but always near at least seasonal water sources, exhibiting artifact assemblages limited to chipped stone tools and very seldom containing subsurface deposits.

(4) Hunting Stations: Small sites (often no more than 25 feet in diameter), located generally in upland ridge crest, hill top, or rim edge settings independent of the occurrence of water, exhibiting sparse scatters of chippage, hunting implements (projectile points) and, frequently, butchering tools (especially knives and scrapers). No such sites have subsurface deposits, save occasional overwash.

(5) Milling Stations: Small sites, largely confined to lowland settings, which exhibit single or clustered ground-stone plant-food preparation implements associated with only minimal chipped artifacts or detritus and not exhibiting evidence of subsurface deposits.

(6) Caves and Rock Shelters: Natural cavities in rock faces or promontories exhibiting cultural materials in their interiors. They occur in all environmental settings, irrespective of the proximity of water, exhibit all varieties of surface artifact assemblages, and yield subsurface deposits ranging from 0 (exposed bedrock) to an estimated 2 feet. Their locations and contents are clearly related variables, though high altitude caves frequently exhibit greater depths of deposit than any open sites in the same settings.

(7) Piled Stone Constructions: Stones artificially piled in rings or short fences ("blinds"), generally in upland settings on ridge crests, hill tops, or rim edges. Though infrequent, they display a distribution strikingly like that of hunting stations. Chipped stone hunting and butchering implements in association strengthen their interpretation as hunting blinds.

(8) Petroglyphs: Artificial designs pecked, abraded, or painted on the surface of (generally) flat rock faces. They have been recorded in proximity to water sources (in one case, near a large base camp) and in settings typical of hunting activity.

(9) Lithic Sources/Quarries: Natural deposits of obsidian, agate, cherts, or other fine grained silicates, which exhibit detritus from the procurement and at least preliminary working of raw lithic material (primary chippage, cores, blades, large bifaces or "roughouts"; see Glossary). Such sites may be relatively limited in area (a few

acres) or, where the resource is abundant, as obsidian is in the eastern half of the study area, may extend for more than a mile. Environmental variables, including the proximity of water, appear not to have figured in whether a given source would be exploited.

(10) Nondiagnostic Lithic Scatters: Sparse scatters of stone chippage, the location and constituency of which do not clearly relate them to hunting activity or to other recognizable subsistence pursuits. Many appear to constitute areas of restricted activity satellite to occupation sites.

The probabilistic sample indicates an average density of 8.19 archaeological sites per square mile for the area as a whole. Accordingly, we predict the occurrence of about 8,000 sites in the proposed grazing allotments. TABLE 2-40 records the observed and predicted site numbers of the individual allotments within the study area. The predictions are based upon the environmental stratification discussed in APPENDIX H.

Factors Currently Affecting Archaeological Resources. Historically, two factors have altered the integrity of archaeological sites in the Tuledad/Home Camp Study Area and continue to do so. They account for the present condition of many of these sites:

(1) Overgrazing and Reduction of Vegetation—The reduction of vegetative cover and the consequent promotion of erosion has had visible effect on open sites (both those confined to surface scatters and those with vertical deposits). Soil erosion and slope wash have in many instances contributed to the lateral displacement and downslope consolidation of surface scatters occurring on terrain of greater than 5 percent slope and have accelerated the attrition of the upper levels of deep deposits. Throughout the area, the contents of sites are being exposed on the surface and their contexts being washed away. Wind ablation of loosened fine, dry silts and clays augments the process. A striking example occurs at a spring system on the east side of lower Surprise Valley: a large occupation site, the constituents, location, function, and soil conditions of which indicate that it at one time contained vertical deposits, has been reduced to a single level. Six thousand years of prehistory are compressed into a .5-inch film on the surface.

Because there has been no long-term program of monitoring, it is not presently possible to quantify the degree to which overgrazing has accelerated the impacts of natural erosion. Cave deposits, many of which are pristine, offer no control as they are generally free from both natural and cattle-related impacts. Excavated village sites in Surprise Valley (O'Connell, 1971; O'Connell and Ambro, 1968), one of which has lain within an intensive-use fenced cattle enclosure for half a century, have sufferred disturbance only of the upper 6 inches of their deposits, a result no doubt related to their well-compacted soils and the relatively level terrain on which they lie. Conversely, a site occurring along Badger Creek, north of the study area, has had a similar intensity of cattle use; because, however, it lies on a 15-percent slope, virtually all cultural materials save the heavier pieces of stone have become consolidated in a narrow strip at the bottom of the slope. Identically situated sites less than a mile away, not subject to intensive cattle use, do not exhibit this effect. Over 50 percent of the sites recorded are suffering deterioration due to erosion.

(2) Vandalism—The looting of archaeological sites, both through surface collection of artifacts and, in some instances, excavation (especially at villages, base camps, and caves), has been an energetically pursued recreational activity in the Tuledad/Home Camp Study Area for several decades. Only one site within the study area (a large Surprise Valley village site on private land) has been rigorously protected for most of this time. One important cave site has been completely excavated by illicit collectors, and 10 others exhibit at least partial testing. A major village site on the west side of Duck Flat, though lying largely on private land, has been the focus of intense digging for at least 20 years, with the result that very little (est. 25 percent) of the original deposit remains intact. While no other habitation site appears to have suffered so severely, about 30 others are known to have been partially excavated or surface collected. The intensity of surface collecting cannot be adequately quantified, though local collections bulk extremely large and the testimony of collectors indicates that few easily accessible and recognizable sites have escaped attention.

The activities of rockhounds have inadvertantly affected the condition of archaeological sites in a similar manner. The vicinities of Tuledad Canyon and the Cottonwood Creek basin are rich in well-known deposits of agate and petrified wood, and

TABLE 2-40

DISTRIBUTION OF KNOWN AND PREDICTED ARCHAEOLOGICAL SITES BY ALLOTMENT

	ALLOTMENTS								
	Tuledad	Selic-Alaska	Home Camp	Bare	Duck Lake	Wall Canyon	Denio	Lower Lake	Bicondoa
Villages	7(3p)1/				1(1p)			8(4p)	
Base Camps	14		2		5				
Temporary Camps	34(6p)		12	19(1p)	3	6	4	5	
Quarries	12(1p)		8	20	3	13	9		
Hunting Stations	11		6	27	9	5			
Milling Stations	2		1						
Lithic Scatters	51		22	49	12(1p)	13	11		
Caves/ Rockshelters	3(2p)		6	7	1	5	1		
Hunting Blinds	1								
Petroglyphs	1		1						
Total Known:	136(12)	0	58	122(1p)	34(2p)	42	25	13(4p)	0
Total Predicted:	1,357	64	2,071	2,776	802	536	333	174	90

1/ Parenthetic numbers indicate sites on private land.

are foci of collecting activity. As these minerals, however, were utilized prehistorically for stone implements, their sources frequently functioned as quarry sites. Every agate outcrop and major deposit of nodules encountered in the 1976 survey exhibits extensive quarrying activity. In their pursuit of these minerals, rockhounds remove some cultural materials (especially cores and quarry "blanks") and, through digging, disturb the context of others.

Historical Resources

The aspirations of many early travellers to the West were confounded by a colossal geographic misunderstanding; the so-called San Buenaventura River was believed, on the basis of inadequate data wrongly interpreted, to flow from western Utah to the Pacific, and to provide a viable route to the California coast. In truth, the river route did not exist, but it was the effort to plot its course which first brought white explorers to the Tuledad/Home Camp vicinity. In 1843, John C. Fremont sought the river; it was his second exploratory foray and, while he failed to map the fugitive San Buenaventura, he pioneered (from west to east) a route which within a decade was to become a principal avenue of westward travel. Fremont's expedition passed through High Rock Canyon, less than 10 miles northeast of the study area boundary, and thence south to the Black Rock Desert (Fremont, 1849).

Lindsay Applegate in 1846 followed Fremont's canyon route in his quest for a wagon road between the Oregon Territory and the Humboldt River. The expedition established the Applegate Cutoff from the then commonly travelled Humboldt River passage to California (Applegate, 1921; Hunt, 1974). Three years later, the California gold rush attracted a flood of settlers and would-be gold tycoons who skirted the study area, passing along the High Rock Canyon wagon trail.

The tide of westward expansion for a while swept past the Tuledad/Home Camp Study Area, but by the 1860's agricultural and grazing interests were becoming established in Surprise Valley and, to a lesser extent, in Duck Flat. From these more favorable centers, a gradual infiltration of the arid lands of the study area was mounted. Between 1865 and 1923 numerous homesteads were patented, virtually all of which continue today as private holdings. The majority focused on spring and meadow settings, thereby extending the legacy of human attention which these areas had received for several thousands of years.

Even at its height settlement remained sparse and has declined since. Though dotted with widely scattered homesteads and foraged by sometimes massive herds, the Tuledad/Home Camp Study Area has always seen more passersby than residents. The Tuledad Canyon-Duck Flat vicinity was for a while a population nucleus, numbering over 80 registered voters among its residents, and an ephemeral service center sprang up at Reiderville in lower Surprise Valley, offering a store, school, saloon, and brothel. The fortunes of Reiderville and Duck Flat suffered from the drought years of 1923-1924, when many agricultural ventures were given up. Now, ruins on the private sector commemorate the earlier activity.

It was during the last decades of the 19th century that intense livestock grazing began to affect the ecological regime of the area and to alter substantially the character of its landscape. Vast cattle and sheep herding operations, including the enormous Miller and Lux partnership, ranged their animals throughout the study area in such great numbers that the abundant native grass communities reported by early settlers gradually succumbed. Today's devastated range conditions form the most visible historical testament of that era.

In addition to the lure of its native forage, the Tuledad/Home Camp Study Area bore the passage of herds and men intent on business elsewhere. Four major avenues crossed the area before the turn of the century:

(1) The Lyon's sheep trail, active from 1870-1900, brought sheep from the Sacramento Valley to the midwest and entrepots of the east. It descended Tuledad Canyon from the vicinity of Red Rock Lake, approximating the route of the old stagecoach road and the modern county road.

(2) The Ardrizzi and Olcese sheep trail brought sheep from the southern portion of the Sacramento Valley, connecting with the Lyon's trail at Duck Flat.

(3) The Madeline-Duck Flat stagecoach road, principally active from 1870-1900, joined Duck Flat with the NC&O railhead at Madeline, California. The route followed the course of the present county road through Tuledad Canyon, save that it followed the canyon bottom out onto Duck Flat. Thence, it approximated the route of Nevada Highway 81 into Surprise Valley.

(4) A military trail, established about 1890, descended Express Canyon and joined the Lyon's sheep trail and the Madeline-Duck Flat stagecoach road at Tuledad Canyon. A stopping place (the Millsap-Hauser station), located in the vicinity of Brine Spring, was operated by a local stage driver.

The historic trails of the Tuledad/Home Camp Study Area are today little more than cartographic exercises. Intensive use for three quarters of a century has obliterated most of their vestiges, though modern roads trace the routes of the sheep trails and the stage line. The Express Canyon military trail has not been graded or paved, but cattle have been trailed up the canyon for many decades, and have carved a deeper, newer path over the old route.

One of the most evocative historical sites in the area and, curiously, one of the most celebrated, has never been located on the ground. In July 1890 the Paiute chief Winnemucca died and was buried with his wife and son, who were slain at the chief's death. The burial apparently was performed in the Tuledad/Home Camp Study Area, and local traditions, often vehemently proclaimed, maintain that the burial site was (1) in the hills west of the Bare Ranch, or (2) on the flats south of Lower Lake, or (3) somewhere in Tuledad Canyon. The argument has been lent vigor by the widely endorsed but suspect conviction that the chief was interred with a burial offering of fabulous wealth.

Cultural Resources of *National Register* Quality

While by MFP decision the Little High Rock Allotment has been excluded from the compass of the proposed action, approximately 12 square miles of the 66-square-mile High Rock Canyon Complex Archaeological and Historic District, nominated to the *National Register of Historic* places, still fall within the boundaries of the Tuledad/Home Camp Study Area. Slightly over 50 percent of this area has not been given sufficient archaeological scrutiny to evaluate the resources occurring there but, on the basis of the probabilistic survey and McGonagle's (1974) work on adjacent lands, it may be projected that the portion within the study area contains about 110 archaeological sites. Significantly, the allotment boundary, which falls along the southern rim of Little High Rock Canyon, excludes from the study area the important caves, rock shelters, and streambank habitations of the canyon floor.

Applying the criteria established in 36 CFR 800 (Advisory Council on Historic Preservation) 56 of the sites recorded in the 1976 survey appear to qualify, individually or as components of districts, for nomination to the *National Register*. These sites, in general exhibit superior integrity of their constituents (i.e., they have not been severly vandalized or impacted by modern developments), relative uniqueness (i.e., they are superior examples of their type), and the potential for yielding significant information for the reconstruction of local patterns of prehistory. TABLE 2-41 summarizes the number, category, and allotment location of those sites identified as being *National Register* eligible. Documentation of all sites and districts so identified will be submitted to the Office of Archaeology and Historic Preservation, National Park Service, and a formal determination of their *National Register* eligibility will be requested. The probabilistic sample indicates that a total of about 1,000 sites in the Tuledad/Home Camp Study Area may similarly qualify.

Of the 430 presently known sites in the area, 374 are considered not eligible for nomination to the *National Register*. Generally, those site categories which customarily exhibit a high information content (especially villages, base camps, caves and rock shelters) or a high degree of uniqueness (especially petroglyphs) have been judged ineligible only where their integrity has been so severely impaired by modern development, erosion, or vandalism that their information has been depleted, their settings altered, and their uniqueness obscured. Other site categories which have intrinsically smaller information contents (especially temporary camps, quarries, hunting stations, and lithic scatters) have been considered eligible only where they constitute especially well-preserved examples of their type, where some feature marks them as unique, or where, as components of districts, they contribute significantly to an understanding of larger archaeological units.

RECREATION RESOURCES

Recreation Activities

Sightseeing, hunting, and rockhounding are the most prominent recreational activities though others occur on a relatively minor scale.

All recreational use in the area is of the dispersed type. Activities are carried out in the natural environment with man-made "facilities" limited to developed access and directional/informational signing.

TABLE 2-41

KNOWN CULTURAL RESOURCES OF NATIONAL REGISTER QUALITY

Allotment & Designation	Attributes and Condition
Tuledad	
AR04-02-144 AR04-02-145 AR04-02-320	Archaeological District, ca. 200 acres. Complex of three upland base camps at saddle above seasonal lake basin. Multifunctional artifact assemblages, vertical deposits. Long chronolgical sequence. Some trampling, especially at 320.
AR04-02-200	Large agate quarry and base camp adjacent to major seasonal drainage. Dense concentrations of quarry debitage, some depth, probably no stratification. Impacted by rock collectors, transect of a major dirt road, some diffuse trampling.
AR04-02-206	Large agate quarry with dense concentrations of artifacts and debitage, and possible vertical deposits. Impacted by rock collectors, dirt road, some diffuse cattle trampling.
AR04-02-208	Base camp on flank of major seasonal drainage. Multifunctional tool assemblage, good integrity, probable depth. Slight cattle trampling, no concentration.
AR04-02-212	Base camp on bench adjacent to major seasonal drainage. Complex assemblage of artifacts, including food preparation equipment and lithics from multiple sources. Vertical deposit. Considerable cattle trampling.
AR04-02-309	Base camp around spring with multifunctional artifact assemblage and vertical deposit. Has been impacted by cattle trampling and some collecting.

TABLE 2-41 (continued)

Allotment & Designation	Attributes and Condition
AR04-02-310	Upland base camp around spring and adjacent to a seasonal drainage. Multifunctional artifact assemblage, abundant food preparation implements, vertical deposit. Has received cattle trampling.
AR04-02-321	Large upland base camp at margin of seasonally dry lakebed. Very dense lithic scatter, abundant artifacts, long sequence. Dirt road crosses site; some evidence of collecting.
AR04-02-375	Base camp at flank of seasonal drainage. Multifunctional artifact assemblage, vertical deposit. Dirt road crosses site.
AR04-02-484 AR04-02-485 AR04-02-533 AR04-02-534 AR04-02-535	Archaeological District, ca. 200 acres. Complex of five occupation sites, including four villages and one temporary camp. Abundant, dense, and complex assemblages of artifacts and cultural detritus. Good vertical deposits. Dirt road crosses one village site; 485, 533, 534, and 535 have received impacts from trampling.
CA-Las-194	The Rodriguez site; a partially excavated and published major village site (O'Connell and Ambro, 1968) adjacent to a perennial stream. Long sequence, occupation floors, interments. Has been impacted by intense surface trampling and a modern road cut. Private ownership.
CA-Mod-197	A partially excavated and published village site (O'Connell, 1971, 1975) adjacent to hot springs. Long sequence, intact buried occupation floors. Has been partially bulldozed. Private ownership.

TABLE 2-41 (continued)

Allotment & Designation	Attributes and Condition
Home Camp	
AR04-02-382	Base camp and quarry around perennial spring. Multifunctional artifact assemblage, possible slight vertical deposit. Cattle trampling, surface collection, and spring development have impacted site.
AR04-02-383	Upland base camp near perennial spring. Milling stones, hunting complex, possible slight vertical deposit. Slight cattle trampling.
AR04-02-407 AR04-02-408 AR04-02-409 AR04-02-410 AR04-02-411 AR04-02-412 AR04-02-413 AR04-02-414 AR04-02-415 AR04-02-416 AR04-02-417 AR04-02-418 AR04-02-419 AR04-02-420 AR04-02-421	Archaeological District, ca. 300 acres. Complex of multifunctional prehistoric sites, including seven caves and rockshelters, four hunting stations, and four lithic scatters. All the cave/rockshelter sites preserve cultural deposits intact, two with good depth and milling as well as hunting complexes. No vandalism or development-related impacts, minimal trampling.
AR04-02-525 AR04-02-526	Archaeological District, ca. 20 acres. Two temporary camps flanking major seasonal drainage. Dense concentrations of cultural materials, some vertical deposit. One campsite has been impacted by bladed fenceline. Little trampling.
Little Indian Spring	Historic: Volcanic rock house at spring (built over prehistoric lithic scatter), two volcanic rock outbuildings. Date unknown.

TABLE 2-41 (continued)

Allotment & Designation	Attributes and Condition
Bare	
AR04-02-132	Rockshelter with intact cultural deposit above seasonal drainage. Associated with upland hunting complex on adjacent and surrounding ridgecrests. Hidden location has preserved integrity.
AR04-02-220	Very large obsidian quarry (ca. 9 square miles) crosscut by seasonal drainages. Extensive debitage, including primary and secondary chippage. Mostly surface, with some overwash. Has been impacted by several dirt roads, extensive collecting, some diffuse cattle trampling.
AR04-02-400	Large temporary campsite around dual spring system with abundant cultural materials (especially hunting complex) and some vertical deposit. Artifacts indicate considerable antiquity. Development of one spring has resulted in concentration of cattle trampling.
AR04-02-442 AR04-02-443	Archaeological District: Obsidian quarry with three coalescent temporary campsites and an adjacent rockshelter with cultural deposit. Major road crosses quarry area, BLM fenceline adjacent to District.
AR04-02-466	Obsidian quarry with subsumed temporary campsite adjacent to seasonal drainage. Very extensive scatter of quarry debitage, vertical deposit in camp area. Trampling around reservoir immediately adjacent.
Wall Canyon	
AR04-02-238 AR04-02-239	Archaeological District: Large, dense obsidian quarry which subsumes several areas of concentrated debitage and includes a rock shelter with intact vertical deposits. Quarry area is crossed by dirt roads.

TABLE 2-41 (continued)

Allotment & Designation	Attributes and Condition
AR04-02-242	Very large obsidian quarry with dense concentrations of debitage. A temporary camp around a spring (on private land) is subsumed. Several dirt roads and fencelines cross the site.
Duck Lake	
AR04-02-470 AR04-02-471 AR04-02-472 AR04-02-473 AR04-02-474 AR04-02-475 AR04-02-476 AR04-02-477 AR04-02-478 AR04-02-479	Archaeological District, ca. 320 acres. Complex of five upland base camps (all with vertical deposit), one temporary camp, and four lithic scatters around interconnected system of spring-fed meadows. Long cultural sequence, superior integrity. Intense cattle trampling around spring heads and wet meadows.
Denio	
AR04-02-126	Large temporary camp (possibly base camp) around spring system. Complex, abundant artifact assemblage, vertical deposit. Intrusive road, water tanks, heavy trampling.
Lower Lake	
Lower Lake Marsh District	Seven coalescent occupation sites along margins of extensive marsh system. Multi-functional artifact assemblages, broad dispersal, little depth. Minimal trampling, some seasonal flooding. Private ownership.

SIGHTSEEING

The greatest recreation is siqhtseeing, which includes viewing scenery, wildlife, and other animals, and geologic features.

The majority of travel for sightseeing purposes occurs along Nevada State Highways 81 and 34. In addition, others enjoy the scenery while travelling secondary routes (MAP 2-18).

At points such as Fox Mountain or Hays Canyon Peak the scenery can be viewed for miles.

Many opportunities exist to view wildlife. Wild horses can be seen along the Buckhorn Road in the south Tuledad area.

Domestic livestock and ranching activities also present an attraction.

HUNTING

Although hunting is the second most popular activity within the study area, hunting pressure varies considerably. This activity is heavily dependent on adequate habitat to provide game and on adequate hunter access, seasons, and bag limits.

Huntable populations of big game, small game, and waterfowl species exist. Most of the area is open to hunters. Shanks (1976) showed that almost 90 percent of the hunters felt access to hunting lands was adequate (his survey included only a portion of the Tuledad area).

ROCKHOUNDING

This activity is third in popularity with much of the interest in collecting petrified wood. Although regulated as to amounts that can be legally removed, past collecting has nearly depleted the resource in several areas (Woody, 1968). Two sites in the eastern portion of the study area are fenced to prevent further illegal removal. A significant amount of illegal artifact removal occurs although the extent is unknown.

Among other specimens in the area that are popular with rockhounds are jasper, obsidian, and agate; areas around Duck Lake and in Tuledad Canyon are popular (Calif. Fed. Mineralogical Societies, 1967).

OFF-ROAD VEHICLES

Types of off-road vehicle (ORV) use include motorcycles, trail bikes, and four-wheel-drive vehicles. Except for limited ORV activity that occurs in the sand dunes and alkali lakebeds of Surprise Valley, the majority of use is directly associated with other recreation activities.

Off-road vehicle activity associated with hunting appears to be increasing annually (Woody, 1968; Shanks, 1976). Shanks (1976) reported that 62 percent of the hunter groups were utilizing one or more four-wheel-drive vehicles. No organized competitive events have been held in the area.

CAMPING

The majority of camping can be directly associated with hunting and rockhounding. Other, limited camping activity results from travellers stopping overnight or from recreationists who are in the area solely to camp.

HIKING

In all portions of the study area, a limited amount of hiking is associated with other recreation activities. The more serious or long-distance hikers are usually travelling to a specific destination, such as the top of a mountain peak or range, hiking the length of a canyon, or following drainages or rims into National Forest areas.

PICKNICKING

Due to small local populations, picnicking in the area is extremely limited. Travellers occasionally stop to picnic.

FISHING

This activity is very limited. Newland, Boulder, Wall Canyon, and Sworinger Reservoirs and Boot Lake are utilized by fishermen, along with the creeks on the east and south slopes of the Warners (U.S. Dept. Int., BLM, 1976e).

Fishing pressure is light. Species include rainbow, Germanbrown, and brook trout. In most waters, fish have been introduced, with periodic stocking by the California Department of Fish and Game (U.S. Dept. Int., BLM, 1976e).

OTHER ACTIVITIES

A wide variety of other activities with relatively low participation, occur.

Back-country or wilderness use is increasing. Although no designated wilderness areas exist in the study area, parcels have been identified for possible future study based on the wilderness provision of the Federal Land Policy and Management Act of 1976 (P.L. 94-579).

Visitor Use

The study area contains no areas that serve as destination-type family recreation areas. Thus, recreationists who travel long distances generally are not participating in family-type activities but are primarily hunting or rockhounding. Travellers and local residents, who seldom remain overnight, account for the remainder of the recreation participation.

Much of the data on recreation use were estimated or computed from secondary sources.

Recreation use levels are low due to lack of population centers in the area, limited access, lack of developed destination-type facilities, and other nearby attractions (in California and adjacent to Reno) that draw recreationists.

While recent factors such as inflation, high unemployment, and the energy crisis may be influencing the amount of recreation use, it is felt that the majority of recreationists are not curtailing their activities but instead are taking shorter trips. Thus, areas with small populations such as the study area may be experiencing a trend of increased use by local residents but decreased use by those living long distances away.

TABLES 2-42 and 2-43 illustrate the types, amount, and location of recreation participation estimated for 1976, expressed in recreation activity occasions. No attempt was made to show data previous to 1976; however, some assumptions in trends in recreation use have been made.

The Nevada SCORP (Stevens, et al.) indicates, that for all recreation activities statewide, an average annual increase in participation of 4.7 percent is occurring while data from the State of California show an average annual increase of over 3 percent. These figures do not greatly differ from a 1974 Bureau of Outdoor Recreation report that indicated an average annual increase of 3.3 for participation in all activities nationwide.

TABLE 2-42 shows the relative importance of the various recreation activities within the study area. The three most important activities, sightseeing, hunting, and rockhounding, comprise 73 percent of the total activity occasions, while on the low end of the scale are fishing (2 percent and picnicking 3 percent). Visitor use was estimated only for the systematic grazing allotments, and not for custodial management allotments or lands excluded from grazing.

WILDERNESS RESOURCES

The study area contains numerous large parcels of public lands that are relatively roadless and undeveloped.

In the process of preparing the Tuledad/Home Camp Unit Resource Analysis/Management Framework Plan in fiscal year 1976, the potential of the study area for primitive area designation was inventoried; however, no areas were recommended in MFP, Step 3 to be so designated.

Based on the provisions of the Federal Land Policy and Management Act of 1976 (the BLM "Organic Act," P. L. 94-579), Section 603, all roadless areas of 5,000 acres or more may potentially be wilderness areas if they possess wilderness characteristics as described in the Wilderness Act of 1964.

In order to determine if various areas possess wilderness characteristics, an accelerated inventory of all roadless areas of 5,000 acres or more in the BLM Susanville District is tentatively programmed for fiscal year 1978.

LAND USES

Livestock Grazing

There are currently 11 allotments within the study area on which BLM regulates livestock use. In addition, there are seven allotments composed of small acreage and percentage of public lands on which numbers of stock or seasons of use are not regulated. TABLE 2-44 shows current authorized livestock use in AUMs in the study area. TABLE 2-45 shows active licensed use from 1972 to 1976.

The following briefly describes the normal operations on the 11 allotments on which BLM regulates livestock use.

Twelve permittees graze cattle on eight allotments and two sheep operators run sheep on three allotments. MAP 2-8 shows allotment boundaries and existing facilities. Three operators utilize public lands and National Forest lands to round out their year-long operations. The remaining operators utilize only public lands. A typical yearlong operation uses an average of 50 percent public lands and 50 percent private land. The typical sheep operator utilizes approximately 80 percent public lands and 20 percent private land.

The average cattle operator runs a cow-calf operation. Calving generally occurs from late February through April on the operator's private lands. However, it is also another common practice to calve on the public rangelands and thus avoid problems of trailing young calves to spring range. Calves are generally weaned and sold in late fall, depending on the market, after they return from the spring-fall ranges.

TABLE 2-42

ESTIMATES OF OUTDOOR RECREATION ACTIVITY OCCASIONS, 1976

Activity	Activity Occasions	Percent of Total
Camping	1,800	5
Fishing	600	2
Hiking	1,600	5
Hunting	7,400	22
ORV	2,300	7
Picnicking	1,100	3
Rockhounding	7,400	22
Sightseeing	10,000	29
Other Activities	1,700	5
TOTALS	33,900	100

Sources: Data calculated or estimated from: sightseeing data from the Modoc and Lassen County Transportation Plans and the Nevada Highway Department; hunting data from BLM, Cedarville Area Office, wildlife personnel utilizing California and Nevada Fish and Game Department data.

TABLE 2-43

ESTIMATES OF OUTDOOR RECREATION

ACTIVITY OCCASIONS BY ALLOTMENT, 1976

Allotment	Activity Occasions	Percent of Total
Bare	8,800	26
Denio	1,100	3
Duck Lake	3,000	9
Home Camp	5,300	15
Lower Lake	2,300	7
Selic-Alaska Canyon	300	1
Tuledad	11,800	35
Wall Canyon	1,300	4
TOTALS	33,900	100

Sources: Data calculated or estimated from: sightseeing data from the Modoc and Lassen County Transportation Plans and the Nevada Highway Department; hunting data from BLM, Cedarville Area Office, wildlife personnel utilizing California and Nevada Fish and Game Department data.

TABLE 2-44

EXISTING LIVESTOCK USE BY ALLOTMENT

	Current Authorized Livestock Use (AUMs)			Suspended Nonuse
Allotment	Public Land	Private Land	Total	(AUMs)
Denio	1,542	91	1,633	0
Wall Canyon	2,609	25	2,634	1,211
Bare	14,737	231	14,968	10,566
Lower Lake	698	-	698	239
Duck Lake	3,284	327	3,611	2,300
Home Camp	8,851	910	9,761	6,142
Selic	255	336	591	10
Alaska Canyon	285	363	648	265
Tuledad	9,913	1,034	10,947	13,049
Biconda	368	-	368	11
Corral	88	0	88	0
Highway	25	0	25	0
Cold Spring Mountain	25	0	25	0
Cedar	10	0	10	0
Boot Lake	42	0	42	5
State Line	5	0	5	0
Clarks Valley	3	0	3	0
Red Rock	132	36	168	0
TOTAL	42,872	3,353	46,225	33,798

TABLE 2-45

ACTIVE LICENSED USE, 1972-1976 1/

Allotment	Public Land	Private Land	Total
Denio	1,378	62	1,440
Wall Canyon	2,523	16	2,539
Bare	13,510	185	13,695
Lower Lake	697	0	697
Duck Lake	3,308 2/	328	3,636
Home Camp	8,936 3/	734	9,670
Selic	253	250	503
Alaska Canyon	329 4/	356 4/	685
Tuledad	9,458 5/	1,258	10,716
Bicondoa	147	0	147
TOTAL	40,539	3,189	43,728

1/ All figures represent a five-year average.

2/ This figure includes an estimated 25 AUMs of use made in the Highway Allotment.

3/ This figure includes an estimated 88 AUMs of use made in the Corral Allotment.

4/ These figures include an estimated 66 AUMs of use made on public lands and 36 AUMs of use made on private land in the Red Rock Allotment.

5/ This figure includes an estimated 66 AUMs of use made in the Red Rock Allotment and 3 AUMs of use made in the Clarks Valley Allotment.

Source: BLM, Susanville District Office grazing files.

Cattle are usually driven to public lands during April and remain there until October. One cattle operator with a National Forest permit trails to the forest in early July and stays until late September. He then returns to his private land.

Both sheep operators spend the majority of their time on public lands in BLM's Winnemucca (Nevada) and Susanville Districts. Both operators winter on the Winnemucca District and return to the Tuledad Allotment in April and June. One permittee moves one band to the Selic Allotment and the other to the Forest. He then returns one band to the Winnemucca District and one band back to Tuledad and private lands, then to Winnemucca. The other sheep operator spends one month in the Tuledad Allotment and then moves to the Forest. He then moves to the Cal-Neva Unit in the Susanville District in the fall and then to the Winnemucca District for the winter. Both operators lamb in the spring on the trail from the Winnemucca District to the Tuledad and Cal-Neva Allotments. Lambs are generally weaned and shipped in late August.

Hay, grain, and pasture produced on private irrigated lands are used for winter feeding.

The following briefly describes the present use of allotments in the study area. All allotments are under continuous grazing except for Wall Canyon and Bare Allotments which are under systematic grazing management systems.

LOWER LAKE ALLOTMENT

Cattle are turned out on March 16 and graze until May 31 when the majority are moved to the Home Camp Allotment. The rest remain in the Lower Lake Allotment until August 31 when they are returned to private lands. Steep topography and lack of water have contributed to poor livestock distribution in the allotment.

HOME CAMP ALLOTMENT

This is a group allotment (four cattle operators). Cattle are turned out on April 1 and graze until September 15 when they are returned to private lands.

Generally, there is sufficient water available during spring and early summer. However, after about July 15, the eastern half of the Home Camp Allotment is poorly watered thereby resulting in a concentration of livestock in Hays Canyon.

DUCK LAKE ALLOTMENT

The cattle operator's base ranch is adjacent to this allotment. His cattle are turned out on April 1 along Wall Canyon Creek and graze until November 30 when they are returned to private lands. Insufficient water has contributed to poor livestock distribution throughout the allotment.

WALL CANYON ALLOTMENT

Two cattle operators run their cattle in the Wall Canyon Allotment. They trail their cattle up Wall Canyon Creek to the allotment. The grazing season is from April 16 to September 15 under the Allotment Management Plan (AMP). The Wall Canyon AMP is a three-pasture deferred-rotation grazing system but, because of limited livestock water, the grazing formula has not been followed successfully.

DENIO ALLOTMENT

Cattle are trailed up Wall Canyon Creek and turned into the southern half of the allotment on April 16. The cattle are moved to the northern half later in the season. Insufficient water has contributed to poor livestock distribution throughout the allotment.

BARE ALLOTMENT

The Bare Allotment is currently under a five-pasture, four-treatment rest-rotation AMP. The cattle are trailed along the highway and turned into one of the lower pastures on April 1. One of the upper pastures is then available for grazing after May 1. Cattle are removed from the allotment on October 31 and returned to private lands. An attempt was first made during the 1976 grazing season to follow the grazing schedule; however, insuffcient livestock water resulted in the system being broken.

TULEDAD ALLOTMENT

The Tuledad Allotment is a common allotment with 10 livestock operators. Eight permittees are cattle operators, one a sheep operator, and one runs cattle and sheep. Cattle are turned into the allotment on April 1 and graze through early July. One permittee then moves part of his cattle onto the Modoc National Forest for summer grazing and then to his private lands. All cattle are moved to private lands by October 31. Sheep are moved into the allotment from the Winnemucca District and the Cal-Neva Unit of the Susanville District between March and April. One permittee moves one band to the Selic Allotment and one band to the Modoc National Forest on July 1. He then moves one band back to the Winnemucca District and one band back to the Tuledad Allotment and private lands until December 9 when he moves them to the Winnemucca District for the winter. The other sheep operator moves four bands to the Modoc National Forest for the summer, then back to the Cal-Neva Unit for fall grazing, and back to the Winnemucca District for winter.

Insufficient water sources have contributed to livestock distribution problems throughout the allotment.

SELIC ALLOTMENT

Sheep are moved to the allotment from the Tuledad Allotment on July 1 and remain until September 11. They are then either returned to the Tuledad Allotment or the Winnemucca District for fall and winter grazing. Dependable water sources are located primarily on private lands.

ALASKA CANYON ALLOTMENT

The livestock operator runs both sheep and cattle on the allotment from June 16 to September 30. The sheep are moved from the Tuledad Allotment for summer grazing and then are moved to the Cal-Neva Unit and Winnemucca for fall and winter grazing. The cattle are moved to private lands for winter grazing.

BICONDOA ALLOTMENT

The livestock operator runs sheep in the allotment from December 1 to January 25. The sheep are then moved to the operator's base property. The base lands have been leased since 1974 and the livestock operator has taken total nonuse on the allotment since 1974.

RED ROCK ALLOTMENT

Two livestock operators currently use this allotment. It is used as a holding field for a portion of the cattle that are moved from the Tuledad Allotment to the Modoc National Forest and for two weeks by the Alaska Canyon operator prior to moving onto that allotment. Sheep also trail through the allotment.

HIGHWAY, COLD SPRING MOUNTAIN, CEDAR, BOOT LAKE, STATE LINE, CLARKS VALLEY, AND CORRAL ALLOTMENTS

These allotments are composed of small acreages or percentages of public lands intermingled with private land. The BLM does not regulate number of stock or season of use on these allotments since they are grazed concurrently with private land.

Agriculture

Most suitable lands in the Surprise Valley are planted to alfalfa or grass hay, some grain, and pasture (MAP 2-17). Irrigation is primarily accomplished from water obtained as runoff from the Warner Mountains. Some irrigation water is also obtained from wells and some is diverted from Wall Canyon and Bare Creeks. Livestock graze the remains after the hay crop is harvested.

Forest Management

There are 390 acres of commercial forest land producing an estimated 73,127 board feet per year in the Tuledad Planning Unit portion of the study area.

No commercial forest occurs in the Home Camp portion. Commercial forest lands are presently in excellent range condition. Mineral Resources

There are no commerical mineral activities within the Tuledad/Home Camp study area.

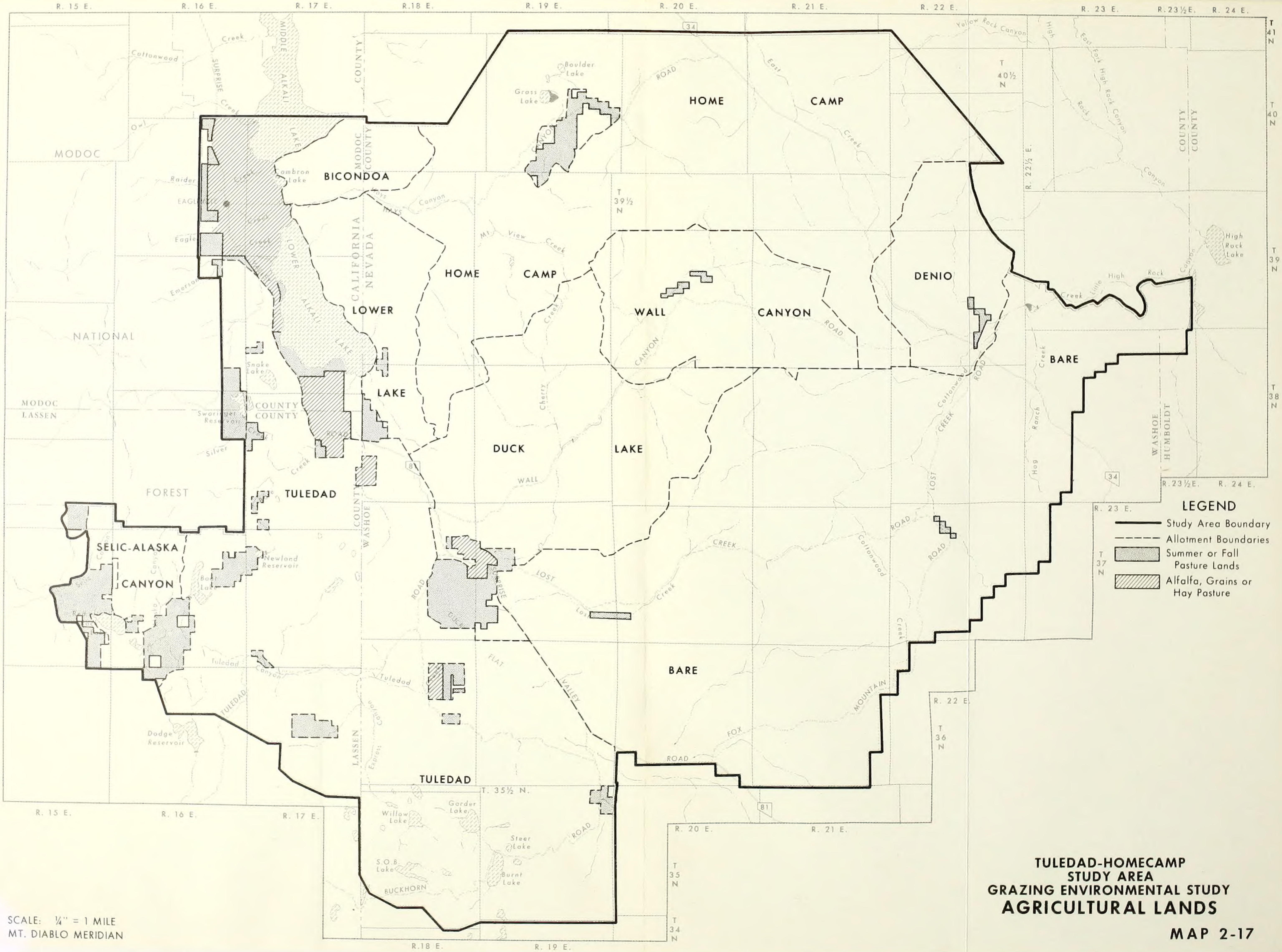
Transportation and Utilities

TRANSPORTATION

The main transportation route serving the Tuledad/ Home Camp Study Area are Nevada State Route 81 flowing north from Reno which merges with Modoc County Road 1 flowing south from Surprise Valley (MAP 2-18). Both roads are paved and maintained year-round. Only heavy snows cause closures for short periods of time. Nevada State Route 34 north from Gerlach serves the east side of Home Camp Planning Unit portion of the study area for approximately nine months until winter storms force its closure. All other roads are seasonal access roads with expected closure from November or December to April.

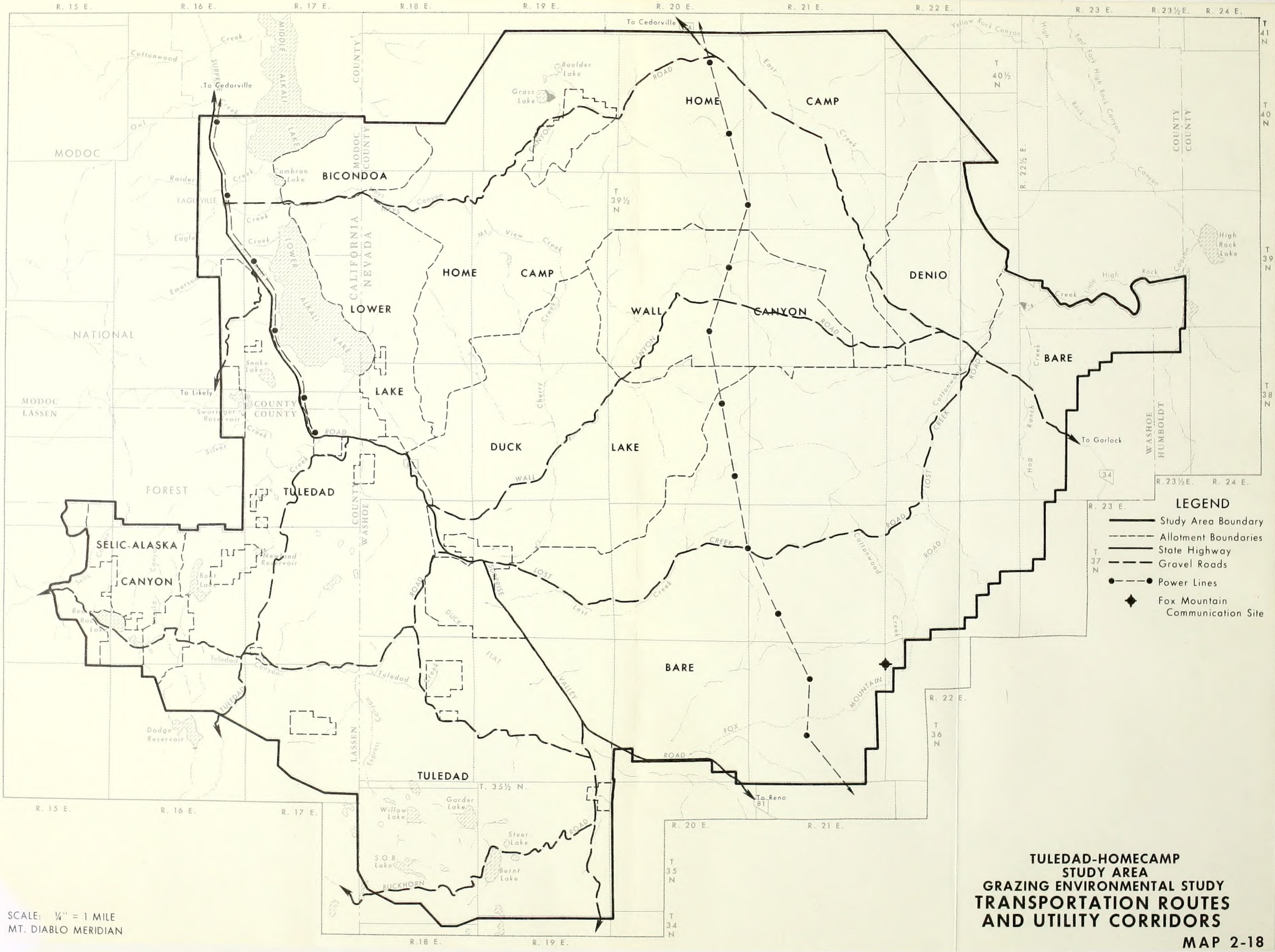
There are no railroad facilities in the study area. The nearest railroad is in Alturas, California, 23 miles west of Cedarville. Most products leaving Surprise Valley are trucked either west over California State Route 299 or south by Nevada State Route 81.

Existing road networks adequately cover transportation needs and no new county projects are expected. The BLM plans for expansion of the road network involve upgrading of existing roads.



TULEDAD-HOMECAMP
STUDY AREA
GRAZING ENVIRONMENTAL STUDY
AGRICULTURAL LANDS

MAP 2-17



TULEDAD-HOMECAMP
STUDY AREA
GRAZING ENVIRONMENTAL STUDY
TRANSPORTATION ROUTES AND UTILITY CORRIDORS
MAP 2-18

UTILITY SYSTEMS

Two utility systems affect the study area: an electric distribution line to Eagleville and the Bare Ranch, which follows the county road and crosses only small amounts of public lands; and a 750 KVDC line which traverses the middle of the Home Camp Planning Unit portion of the study area in a north-south direction.

COMMUNICATION SITES

The only existing communication site is on Fox Mountain. This site has facilities for BLM (Susanville and Winnemucca), Washoe County, and Los Angeles Department of Water and Power.

Land Use Controls and Constraints

The State and private lands in the Tuledad/Home Camp Study Area are under the jurisdiction of California, Modoc and Lassen Counties, and Nevada, Washoe and Humboldt Counties. Zoning in the area is classified as open or unrestricted general agricultural, and restricted agricultural. All lands within the Tuledad/Home Camp Study Area in Washoe and Humboldt Counties are classified as open or unrestricted zoning. That portion of the study area in Lassen County is zoned as general agricultural, and the portion in Modoc County is classified as general agricultural, restricted agricultural, or open.

All public lands in the Tuledad/Home Camp Study Area are subject to policies and regulations of the Federal Land Policy and Management Act of 1976 (P.L. 94-579).

Socio-Economic Conditions

Economic Conditions

REGIONAL ECONOMIC FACTORS

For purposes of analysis, the region is defined as consisting of Lassen and Modoc Counties (California), since most ranch headquarters, populace, and business flows are located here. This region represents the actual impact zone.

Population

Population densities are generally less than one person per square mile. The statewide average in California is 127 persons per square mile; Nevada's average is five persons per square mile.

The 1975 population of Lassen County was 18,500 and that of Modoc County 8,100. Recent trends indicate that the population is increasing (Calif. Employment Development Dept., 1975). Population and housing counts for the Bald Mountain and Gerlach Townships (northern Washoe County, Nevada) indicate a resident population of less than 120 (Dugger, 1976).

Employment

The combined labor force in Lassen-Modoc Counties is 11,025 (Calif. Dept. Employment Development, 1976, p. 2). Labor force characteristics for the portion of the study area in Washoe County north of Gerlach are not available. However, based upon population estimates made by Enumeration District for the Bald Mountain and Gerlach Townships, it is thought that the area labor force numbers less than 50 individuals.

Unemployment in this region is a serious problem. In 1975, unemployment in Modoc County averaged 11.9 percent and in Lassen County 19.8 percent.

TABLE 2-46 indicates, by industry, the number of individuals employed within the region.

Agricultural employment has decreased during the last two decades. In 1950, the agricultural sector in Lassen County employed 750 people or 10.7 percent of those employed; by 1975, 450 (8.2 percent) were employed in agriculture. In Modoc County in 1950, agriculture (including forestry and fisheries) employed 1,194 individuals (32.0 percent); by 1975, 1,075 individuals were employed (29.1 percent of those employed).

Income

In 1974, Modoc County's per capita personal income was $5,793 or about 96.0 percent of the State average. Lassen County's per capita personal income for 1974 was $4,498, only 74.6 percent of the State average. Washoe County's per capita personal income for 1974 was $4,637, or 76.9 percent of the Nevada State average (U.S. Dept. Commerce, Bureau of Economic Analysis, 1976).

In 1974, total industry earnings amounted to $542,001,000 for Lassen, Modoc, and Washoe Counties (U.S. Dept. Commerce, Bureau of Economic Analysis, 1976).

The farm industry produced approximately 11.2 percent of all earnings in Lassen County in 1974 and 44.7 percent in Modoc County. Washoe County reported a negative farm earnings figure during this period. In California and Nevada, the farm industry produced approximately 3.9 percent and 1.6 percent, respectively, of the total earnings within each State.

TABLE 2-46
NONAGRICULTURAL WAGE AND SALARY AND AGRICULTURAL EMPLOYMENT

	Lassen County Average Annual Employment & %				Modoc County Average Annual Employment & %			
	1974		1975		1974		1975	
Labor Force1/	6,750		6,825		4,275		4,200	
Employment	5,575		5,475		3,825		3,700	
Unemployment	1,175		1,350		450		500	
Unemployment Rate	17.4%		19.8%		10.5%		11.9%	
Nonagricultural Wage and Salary2/	4,800	(86.1%)	4,850	(88.6%)	1,825	(47.7%)	1,875	(50.7%)
Construction & Mining	50	(1.0)	75	(1.4)	25	(4.0)	50	(1.4)
Manufacturing	525	(9.4)	350	(6.4)	200	(5.2)	150	(4.1)
Transportation, Communication & Utilities	225	(4.0)	200	(3.7)	100	(2.6)	100	(2.7)
Trade	675	(12.1)	650	(11.9)	300	(7.8)	300	(8.1)
Finance, Insurance & Real Estate	125	(2.2)	125	(2.3)	50	(1.3)	50	(1.4)
Services	550	(9.9)	525	(9.6)	350	(9.2)	325	(8.8)
Government	2,650	(47.5)	2,925	(53.4)	800	(20.9)	900	(24.3)
Agriculture	450	(8.1%)	450	(8.2%)	1,075	(28.1%)	1,075	(29.1%)

1/ By place of residence.

2/ Employment by place of work. Approximately 900-1000 people reside in Lassen-Modoc Counties but work elsewhere and so are not included in this table. Also, proprietors are not included in these figures.

Source: Labor Force, Employment and Unemployment, California Employment Development Dept., Northern California Employment Data and Research, 1976.

There are about 790 farms/ranches in Lassen and Modoc Counties which utilize approximately 22 percent and 29 percent, respectively, of the total land area within each county (see TABLE 2-45 Agriculture section). There are an estimated 57 farmers/ranchers in the Nevada section of the Susanville District; most of these individuals have their headquarters in California and are therefore included in the Lassen-Modoc County statistics (Watanabe, 1975, p. 16). Of the total land area included in these farms and ranches, over 80 percent is used exclusively for grazing.

Livestock (TABLE 2-47) and livestock products, in relation to the total agricultural output, are an important revenue source within the study area. For example, in 1974, livestock products constituted 40.1 percent of Lassen County's gross agricultural income, and 17.5 percent of Modoc County's. Of these totals, beef cattle and sheep accounted for sales of $6,580,300 in Lassen County in 1974 and $7,676,200 in Modoc County (U.S. Dept. Agr., 1975 a and b).

TABLE 2-47.—*Livestock inventories as of Jan. 1, 1974*

Livestock	*Lassen County*	*Modoc County*	*Total*	*AUMs*
All cattle and calves	57,500	90,000	147,500	1,770,000
All sheep and lambs......	3,600	9,200	12,800	30,720

Source: Agricultural Crop Reports, Lassen-Modoc Counties, USDA, 1975a and b.

To accurately portray the income effect attributed to the livestock industry for this region, it is necessary to analyze livestock earnings in relationship to livestock forage, not just to gross sales.

In 1974, the total annual range livestock feed requirement was 1,800,720 AUMs, providing a livestock sales figure of $7.92 per AUM of feed required.

To determine how the average sales figure of $7.92 per AUM for the study area affects the regional (and local) economy, it is necessary to consider "multiplier effects" (see GLOSSARY). The range livestock multiplier factor for the study area is calculated to be 1.74; gross sales generated into the economy per AUM are estimated to be $7.92; thus, each AUM stimulates the regional economy by $13.80 (Univ. Calif., Coop. Extension, 1974, p. 27).

This figure is computed by multiplying beef cattle numbers shown in TABLE 2-47 by 12; sheep numbers are also multipled by 12, but then must be divided by 5 since a sheep AUM is only equivalent to .2 of 1 AUM. Then, by dividing total livestock sales by total feed requirement ($14,256,500 divided by 1,800,720 AUMs) a gross sales figure of $7.92 per AUM of feed required can be derived.

The contribution or importance of forage from public lands to the livestock industry and the regional economy can also be estimated. Livestock licensed by BLM consumed an estimated 201,000 AUMs of range forage throughout the Susanville District in 1974, yielding gross sales of $1,591,920 (201,000 x $7.92), and a total effect on the economy of $2,773,800 (201,000 x $13.80). Thus, public lands contributed an estimated 11.2 percent of the region's gross livestock sales ($1,591,920 divided by $14,256,500). However, on a Districtwide basis, public lands forage produces 0.46 percent of the region's total personal income.

In 1974, the California Department of Finance, Budget Division, calculated the region's total personal income to be $128,065,000. The Lassen County input-output model (developed by the University of California, Berkeley) indicates that for each $1 of livestock sales, the household sector receives $.37. This includes both direct/indirect effects. Income attributed to BLM livestock forage therefore equals $589,010 ($1,591,920 x .37). Therefore, public lands forage produced 0.46 percent of the region's total personal income ($589,010 divided by $128,065,000).

RECREATION-RELATED INCOME

Figures indicating levels of recreational use by activity occasion (see GLOSSARY) for 1976 are shown in TABLE 2-42 of the Recreation section. Total economic gains from such pursuits are not known, however, since a recreationist may participate in any number of activities during a given day. Therefore, any attempt to estimate expenditures would be misleading.

Recent studies in Plumas County conducted by the University of California indicate that tourists spend about $21 per person per visit (Univ. Calif., 1973). These aggregate expenditures all remained within the recreation area being visited.

Public Finance

Property tax rates in Modoc County for Fiscal Year 1975 range between $6.95-$9.51 per $100 of appraised value. In the rural areas, this rate varies between $7.00-7.50. In Lassen County, property tax rates for 1975 vary between $6.53-12.15 per $100 of appraised value. Rural rates were placed at $7.00-8.50. In comparison, the average tax rate for California for Fiscal Year 1975 was over $11.15 per $100 (Farwell, 1976). In northern Washoe County, property tax rates for Fiscal Year 1975 were strictly applied at the rate of $3.94 per $100 of assessed value (Goulden, 1976).

LOCAL ECONOMIC FACTORS

Population

Eagleville, with a population of less than 30, is the closest community to the ranch units operating in the study area.

The only other populations in or near the study area are the 13 isolated livestock operators and their families located at the ranch headquarters, with a total population of approximately 60. The total population of the study area, including the ranch families in Surprise Valley, is estimated at less than 250 (Watanabe, 1975).

Employment

Eagleville is rural in character and is a limited service center. The only businesses are a small grocery store in association with a gas station and a bar. There is also a church and park. The school in Eagleville is abandoned. Children are now bused to Cedarville, the main service center for Surprise Valley, 20 miles north of Eagleville.

It is estimated that ranches in the area employ approximately 25 individuals on a full-time basis. These limited-employment figures indicate that many ranchers cooperate with their neighbors during brief peak-labor-demand periods. Almost all of the paid employees come from Modoc and Washoe Counties. A few individuals also alternate employment in two or more locations, i.e., where several ranches may be run by one family operation. Some family members are employed in other fields or are in school but return temporarily to assist.

Income

Income in the Tuledad/Home Camp Study Area is generated primarily from livestock ranching. The relationship between the local economy and the utilization of resources will be examined, followed by a discussion of incomes generated by the allotments in the study area.

Approximately 92.4 percent of the lands within the Tuledad/Home Camp Study Area are under BLM jurisdiction (U.S. Dept. Int., BLM, 1976e). Active use by allotment and suspended nonuse are shown on TABLE 2-44, Livestock section.

Nine ranch units (13 operators) run a total of 14,047 head of cattle and 6,037 head of sheep, which represents a total demand for forage of 183,053 AUMs per year.

Individual sales by allotment are not available. However, the contribution that forage from public lands provides to the livestock sector and regional economy can be calculated as follows: BLM presently licenses 46,225 AUMs within the study area, which yield a gross sales figure of approximately $366,102 (46,225 AUMs x $7.92). The total effect this forage has on the area economy is an estimated $637,017 ($366,102 x 1.74). Thus, the public lands in the Tuledad/Home Camp Study Area contribute an estimated 4.8 percent of Modoc County's livestock sales ($366,102 divided by $7,676,200), and 0.3 percent of Modoc County's total personal income ($135,458 divided by $46,799,000), including both direct and indirect effects. The income data for the Tuledad/Home Camp Study Area are assumed to be reflected in available information presented earlier in this chapter for Modoc County, as most of the ranchers within the study area live in Surprise Valley, and their income is reflected in Modoc County statistics. The latest available data are for 1974, at which time livestock sales for Modoc County were $7,676,200 (USDA, 1976, p. 10); total personal income was $46,799,000 (Calif. Dept. Employment Development, 1976). Percent of personal income derived from public lands forage can be computed by the following formula: gross livestock sales X household coefficient developed by the University of California's input/output model divided by Modoc County's total personal income ($366,102 x .37 divided by $46,799,000). However, the public lands in the study area are much more important than these figures would appear to indicate, providing 25.3 percent of the forage needed to support the Study Area's livestock numbers (46,225 AUMs divided by 183,053 AUMs).

The calculation of gross values by production attributable to rangeland is complicated by production cycles which include the utilization of not only rangeland but also croplands and harvested feeds. Also, these production values should not be confused with returns to land which represent a fair lease value, which in Lassen, Modoc, and Washoe Counties now averages $7 per AUM (U.S. Dept. Ag., Economic Research Service, 1975).

There seems to be a continuing trend toward ranch consolidations in the area, a reflection of economies of scale, where the more viable operations have increased their operation size to reduce costs per unit of production.

RECREATION-RELATED INCOME

Recreational use characteristics by allotment are shown in TABLE 2-43, in the Recreation section. As indicated in the previous discussion on recreation and its influence on the regional economy, no attempt has been made to calculate any dependency factors for recreation.

Regional Social Characteristics

The remoteness of the study area and its sparse population, coupled with the fact that many decisions made outside the area affect its economic situation, create distinctive cultural-attitudinal patterns. The following discussion of attitudes with respect to the study area is based on two recent surveys (Renewable Resource Center, Univ. of Nev.; Ruth Houghton, Anthropologist, Reno), a University of Nevada thesis (Woody, 1968), statistical abstracts, BLM data, and newspaper and other articles. In addition, telephone and personal interviews were informally conducted.

WILD HORSE POPULATIONS

Most organizations affiliated with the livestock industry (i.e., California Cattlemen's Association, and Nevada Wool Growers Association), stress control of numbers of wild horses and protection of other multiple-use values. Stockmen recognize that other demands will continue to be placed on public lands; they also recognize that if wild horse and burro populations are uncontrolled, the detrimental effects on wildlife and livestock which also use the area may be significant. Reduction to "acceptable" numbers, rather than complete extermination, is advocated. Other interest groups (e.g., Public Land Council; Nevada Department of Fish and Game), espouse similar viewpoints (Plummer, 1975). Comments received during BLM's URA-MFP public meetings also stressed control, primarily because all other uses of public lands are controlled.

Certain recreation-oriented journals/newspapers based outside the region present viewpoints of other individuals within the region. For example, Trueblood (1975) concluded that wild horses and burros would: (1) lead to the extinction of pronghorn antelope and other mammals; (2) devastate forage plants essential to both domestic and big game animals; (3) damage watershed; (4) cause bankruptcy to ranchers due to increased population numbers; and (5) incur eventual decimation by starvation and disease. An environmental newspaper published outside the region stated that "in most areas where there are substantial concentrations of wild horses, there are poor and declining range conditions from the *severe competition* between cattle, sheep and other wildlife" (emphasis supplied) (High County, Wyo., *News*, 1974, p. 4).

Attitudes regarding control methods also exist. Some individuals vehemently oppose the use of fixed-wing aircraft but are less opposed to the use of helicopters. Others say it should be "man against beast." There are those who advocate using aircraft, cowboys, and ORVs to corral the horses. Finally, some comments received at various BLM public meetings raise the question of introducing natural predators, e.g., mountain lions, to control numbers (Plummer, 1975).

Other questions regarding management of wild horses and burros include: (1) the conflict of fences with migration routes; (2) the responsibility of wild horses for deteriorating range conditions; (3) the suitability of AUMs provided for wild horses; and (4) the advisability of allocating large numbers of AUMs to a use from which no economic returns will be forthcoming.

To local inhabitants, these horses bring to mind scrubby animals whose genetic background can be traced to domestic livestock (once removed) which have been turned out on the public range to fend for themselves. To groups and individuals outside the region, there is an intangible benefit in providing lands for wild, free-roaming horses.

RECREATION

The University of Nevada's Renewable Resource Center indicated that, while 48 percent of those surveyed favored some type of control of off-road vehicle use, nearly 30 percent agreed that there should be no control whatsoever; 16 percent were undecided. Nearly 75 percent favored the construction of waterholes to assist in deer management, 12 percent disagree and 11 percent were undecided. Less than 3 percent stated that poor hunting would be one reason not to hunt more. Collection of a deer is apparently only one factor, affecting the amount of hunting done by an individual. Other important reasons many hunters gave as a partial motivation for their hunting excursions included the change of pace afforded by hunting, companionship, taking children into the outdoors, relaxing, and "getting away from it all."

Woody (1968) conducted a survey to "gain basic knowledge about recreational users as to demographic data, their likes and dislikes, and their awareness of the natural resources they knowingly/unknowingly utilize" (p. 2). One conclusion drawn from Woody's questionnaire, which surveyed recreational use in northern Washoe County, was that 72 percent of the hunters responding opposed any additional roads in the area, although 57 percent of the nonhunters were in favor of more roads.

Woody also found that, when questioned about whether management agencies should spend funds/manpower to improve the area for public use, only 45 percent of those responding said "yes"; 42 percent said this should not be done.

Certain conclusions reached by Woody appear to be verified by Shanks (1976); apparently, in this specific case, attitudes have not shifted much over time. For example, one conclusion reached by Woody was that neither BLM, as manager of the public lands, nor the public, as users of the public lands, understand one another; however, "both . . . are quick to criticize the other . . ." The Shanks survey reached a similar conclusion.

Depiction of attitudes and values held by "recreationists" is partially complicated by the different categories of user groups included in the "recreation" category. Some recreationists advocate unlimited ORV use; others want complete closures in certain areas to maintain and preserve the pristine quality of those areas. Others (particularly nonhunters) want more access roads. Attitudes which most recreationists appear to hold in common are: (1) concern over the placement of livestock projects (fences, etc.) and their effects on area wildlife species; and (2) concern for correct and proper identification of property lines to permit distinction between private and public lands.

Woody (1968) sent out questionnaires to 55 livestock operators in northern Washoe County to determine their general relationship with recreationists. Twenty-six questionnaires were completed and returned.

Based upon the returns, one of the major concerns was with recreational use around existing water supplies. Recreationists tend to deny livestock use of the water and they sometimes intentionally harass stock to move them away from their camps. Major increases in recreational use could challenge present patterns of ranch operations.

RANCHING

The ranching sector in this region is considered a socio-cultural group. There is a very clear distinction in cultures between the rural study area and ubranized areas, such as Reno, Sparks, or Sacramento. These cultural differences are historical. Ranching, mining, and logging have always exerted a profound influence within this region, which has led to small but stable populations and a homogeneity and continuity of the values, beliefs, and attitudes normally held by rural residents. Newcomers to the area often accept the prevailing value system they encounter upon settling within the region.

One value held by most ranchers is that of personal identification. To these individuals, telephone calls or letters are impersonal—the best interactions are those conducted face to face. These feelings are accompanied by the firm belief that "local people know the conditions of the land, of other people and the history, so they are best equipped to decide how to use local lands, whether for economic, residential, or recreation purposes" (U.S. Dept. Int., BLM, 1976e).

One pervasive behavior pattern which may reflect attitudes is the tradition of ranchers to resist Federal intervention. The ranching culture reflects resistance to outside controls and, instead, seems to favor self-reliance and individuality. The ranchers take pride in living in this remote and isolated area; it reflects their ability to persevere and manage under extremely difficult conditions. They often boast of being perhaps the last bastion of free enterprise in the United States and indicate that they neither want nor solicit government aid or price supports. They realize that their numbers will decline in future years as the more technically oriented or more aggressive consolidate their holdings to achieve economies of scale. Yet adherence, even loyalty, to previously adopted practices makes adaptation to new policies incomprehensible and, therefore, their future uncertain.

Although this lifestyle is based upon individuality, there is a pervasive conservatism within this sector. Progressiveness can be accepted, but too much innovation or originality is associated with unpredictability. Without predictability, the actions of others within the same cultural sector cannot be anticipated. The key to this lifestyle appears to be maintaining individuality and predictability. Another reason for this conservatism may be tied to the concept of "bound dependency," wherein a son might have to continue to work for his father or any relative for several years before he becomes financially independent. Not all sons seem willing to accept this kind of role, but those who are often tend to be more conservative, "thus the selective survival of conservative operators could be continued into another generation" (Bennett, 1966, p. 53).

Many ranch operators see large corporation ranches within the region as "usurpers," speculators on lands for tax benefits without working the ranch properly. Corporate ranches are usually owned, and sometimes managed, by nonresidents. Local ranchers are somewhat resentful since the large ranches make expansion impossible, they drive land prices up, and they take up land which could provide a livelihood for several families. Families are perceived as contributing to the community, both economically and socially; absentee or outside corporate owners do not.

FUTURE ENVIRONMENT WITHOUT THE PROPOSAL

The future environment depicted below is that which could be anticipated to occur in the study area by the year 1990 in the absence of the proposal. Only those elements of the environment that would be expected to change by that date are discussed.

Vegetation

Aspen stands, presently constituting approximately 1 percent of the study area, would continue to deteriorate and be replaced with big sagebrush dominated communities. Silver sage-big sage/sedge communities would replace much of the willow/Nevada bluegrass community. Condition of the Nevada bluegrass-sedge habitat type would be "poor." The vegetation in the area would be less diverse and less stable.

Soils

Changes in the vegetation communities, discussed above, would result in decreases in litter and cover, affecting soils in the area. These soils include phases of the Karlo, Disabel, Jesse Camp, Coultebar, McConuel, Hapgood, Newlands, Home Camp, Snag, Bluebell, Foxmount, Tourn, and Waca series. There would be an increase in erosion potential.

Water Resources

Watershed conditions would be somewhat better in the Wall Canyon allotment than in the remainder of the allotments where season-long grazing would continue.

Animals

The habitat of large terrestrial animals would deteriorate and, in response, populations would be less than present levels. Sage grouse populations would remain stable or decline slightly. Quail populations might be eliminated. Populations of non-game species would be less. Continued deterioration of aquatic habitat would result in a long-term decline in trout populations, although possibly not within 15 years.

Cultural Resources

Continued trampling by livestock would result in continuation of adverse impacts on cultural resources throughout the study area.

Recreation Resources

Some additional recreation use is possible because of increased demand.

Land Uses

No significant changes in human populations are anticipated within the study area. Increased geothermal development, if it occurred, could result in an increase in employment of 215 during the first seven years, with a decline to 20 employees after that period. Livestock use would be expected to be at 75 percent of present levels, and a decrease of $31,668 in household incomes would be likely to result. Other than the possibility of geothermal development, no significant changes in land use are anticipated. The trend toward increased consolidation of ranches would probably continue.

Chapter 3

ENVIRONMENTAL IMPACTS OF THE PROPOSED ACTION

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ENVIRONMENTAL IMPACTS OF THE PROPOSED ACTION

Where components of the proposed action are not discussed below in certain resource analyses, little or no impacts were predicted; the discussion is therefore omitted. In addition, it was predicted that some resources such as minerals and timber would not be impacted by the proposal; therefore these resources have been omitted from any further analysis.

VEGETATION

The impacts of the proposed action on vegetation would vary greatly in terms of management components and phases of operation. Impacts are addressed in the following order.

(1) Systematic Grazing Management
  A. Impacts of each grazing treatment
  B. Short-term impacts of a grazing cycle
  C. Long-term impacts (15 years)
  D. Three-pasture versus two-pasture system
  E. Impacts on habitat types
  F. Impacts by allotment
(2) Custodial Grazing Management
(3) Grazing Exclusions
(4) Facilities To Implement the Proposal
(5) Reseeding Tests

Systematic Grazing Management

INTRODUCTION

Systematic grazing management would affect 669,971 acres or approximately 75 percent of the study area.

A plant's health and survival depend on its abilities to synthesize and store food, form vegetative structures for renewal of top growth, maintain a healthy root system, and produce reproductive organs (Stoddart, et al., 1975). Grazing, through removal of photosynthetic leaf tissue, interferes with these processes. Systematic grazing management is designed to offset these impacts by providing rest. The importance of rest to restoring plant vigor and health has been recognized by many authors (Sampson, 1951; Rogler, 1951; Cooper, 1953; Puckett, 1956, from Hedrick, 1958; Hedrick, 1958; Hormay and Talbot, 1961; Larin, 1962; Johnson, 1965; Anderson, 1967; Valentine, 1967; Hormay, 1970; Ratliff, et al., 1972; Stoddart, et al., 1975). According to Hormay's (1970) concept, a pasture is rested after a season of grazing to: (1) allow plants opportunity to make and store food, to recover vigor; (2) allow seed to ripen; (3) allow seedlings to become established; and (4) allow litter to accumulate between plants. As vigor improves and competitive relationships within communities are changed, successional trends are correspondingly affected.

The philosophy of starting systematic grazing management with existing stocking rates and with the anticipation of adjusting grazing pressures downward, if necessary, contains certain risks.

Three major premises upon which this action is based are questionable: (1) that the flexibility of the proposed grazing systems is sufficient to prevent resource damage ("grazing management flexibility," as used in this context, refers to the flexibility afforded the range manager in adjustment of grazing pressure to effect a desired vegetative response); (2) that adjustment in livestock numbers and/or seasons of use can be satisfactorily made during the initial grazing cycle, so systematic grazing management will be operational by the second cycle; and (3) that although the systems may be "broken" during the first cycle, vegetation will still respond sufficiently to provide the forage base necessary to make the systems fully operational by the second grazing cycle.

Although the best estimates of grazing capacities are based on knowledge of past and present stocking levels and present vegetative trends, grazing capacities may change greatly with changes in management systems (Stoddart, 1960). Effects of redistribution of livestock cannot be mathematically predicted, since changes in patterns of use and competitive relationships with wild animals vary greatly with highly localized, often unknown, differences in habitat.

Therefore, grazing capacities of individual pastures under a new management system truly cannot be predicted ahead of time. For exactly this reason, it cannot be accurately anticipated whether a given pasture will be overstocked or understocked in the initial grazing cycle. If overstocked, resource damage would ensue. Damage would be greatest to soils, since accelerated erosion resulting from increased reduction of soil cover would be an irretrievable loss, the degree of which would be related to the degree of cover removal and the timing and intensity of rainfall and/or winds. Accelerated erosion would affect the potential rate of vegetative recovery. However, the proposed action specifies that the systems would be "broken" during the initial grazing cycle while adjustments in livestock numbers and/or seasons of use are being made. During this period, the systems would function as deferred-rotational grazing systems, thereby alleviating the effects of excessive grazing on the first pastures used and increasing plant vigor in the last pasture used. Nevertheless, there would be nothing which guarantees that ground cover in some pastures would not be reduced beyond any specified limit.

If grazing capacities were equivalent in each pasture of each allotment, and precipitation were similar in each year of the initial grazing cycle, it would be reasonable to expect livestock numbers and/or seasons of use to be satisfactorily adjusted during the initial grazing cycle and the systems to be fully operational by the second cycle. However, such circumstances would not be anticipated. Instead, adjustments would be made dealing with an entirely different set of circumstances each year, the interactions of which would greatly complicate accurate assessment of the effects of livestock grazing pressure alone. If grazing capacities were to be overestimated at the end of this period, resource degradation would continue into (and beyond) the second grazing cycle. The monitoring systems would not demonstrate a need for further adjustments until changes in resource conditions and trends were measurable.

Although the grazing systems might be "broken" during the first grazing cycle, plant vigor would be expected to increase as a result of deferment. Whether it would increase sufficiently to provide an adequate forage base for a fully operational rest-rotation grazing system would depend upon the state of vigor of individual plants when the systems were initiated and the vegetative impacts incurred during the initial grazing cycle.

The vegetation monitoring system would not demonstrate the need to adjust grazing pressure until several years after resource conditions change. Data from a minimum of two grazing cycles (six years for the three-pasture systems and four years for the two-pasture system) following the initial "phase in" cycle would be necessary to adequately demonstrate a vegetative trend.

The following analysis of impacts is made in light of the above-mentioned uncertainties.

GRAZING TREATMENTS (YEAR TO YEAR)

Generally speaking, vegetative impacts of the "use" treatment would largely be adverse, while those of the "seedripe" and "rest" treatments would largely be beneficial.

Treatment A (the "use" year)

Vegetative impacts of this treatment would largely be adverse. Approximately three times the number of livestock presently grazing a given land area would initially be confined to the "use" pasture of the three-treatment systems from approximately April 1 through August 1 (or until adjustments were made), until the "seed-ripe" pasture is opened for grazing. The net increase in grazing pressure over existing pressure would vary with turnout and seedripe dates of specific allotments. It would be less than three times but considerably more than existing pressure. Grazing pressure would initially be twice the existing level during the "use" treatment of the two-pasture system. Heavier grazing pressure would result in increased consumption of desirable forage species. However, greater concentration and better distribution of cattle would result in increased consumption of less desirable species. Total utilization of the major forage species (on the grazing allotment as a whole) has been found to decrease (Johnson, 1965).

Perennial plants rely on carbohydrate and nitrogen reserves during periods of dormancy and to initiate growth following dormancy. The major impact of grazing upon vegetation is the reduction of photosynthetic tissue by removal of green forage, thereby decreasing net primary production and increasing demand on stored carbohydrates and nitrogen to restore the photosynthetic tissue. Reduction of primary productivity and carbohydrate reserves interferes with the plant's life processes and results in decreased vigor and root production (Parker and Sampson, 1931; Robertson, 1933; Biswell and Weaver, 1933; Flory and Trussell, 1938; Hanson and Stoddart, 1940; all from Stoddart, et al., 1975). In semi-arid regions root production is highly critical to plants and must be adequate to obtain soil moisture from ever-deepening depths as the surface layers become progressively drier. Anything leading to decreased vigor and root production, therefore, leaves a plant at a disadvantage in competitive relationships with plants not similarly affected.

Carbohydrate reserves show marked seasonal fluctuations (Hormay, 1970; Stoddart, et al., 1975), but two especially critical periods have been identified (McCarty and Price, 1942, from Stoddart, et al., 1975) in the growth of forage grasses: (1) the period of active reproduction from flower stalk formation to and including seed ripening, and (2) the forepart of the normal carbohydrate-storage period. These are periods when carbohydrate reserves are lowest and demand on stored carbohydrates is greatest. They are the most critical periods for shrubs as well (Garrison, 1972). Plants would be grazed during both periods in the "use" treatment.

Reproduction of forage species would be seriously interfered with during the "use" treatment, not only through decreased production of reproductive organs but also through the consumption of reproductive organs and the destruction of seedlings by grazing and trampling. The first process is usually of far greater importance than the others (Stoddart, et al., 1975). Limited reproduction of forage species would be expected to occur.

Most shrubs and forbs, unlike grasses, are not well adapted to regenerate forage removed through grazing during that same year, although browsing of shrubs often encourages twig growth at the expense of flowers and fruits in following years (Stoddart, et al., 1975; Garrison, 1972). In this respect, the "use" treatment might have some beneficial aspects for such palatable shrubs as snowberry and little rabbitbrush by keeping them in a vegetative condition and thereby increasing forage production (Garrison, 1953, from Stoddart, et al., 1975). The result of browsing during this time would be related to the vigor of the individual plants and the degree of utilization they receive (see Short-Term Impacts). Generally, perennial forbs are less resistant to grazing and trampling than are grasses (Stoddart, et al., 1975) and should therefore be more severely impacted than grasses during the "use" treatment.

Soil compaction due to trampling would occur when the soil is damp. Compaction restricts normal root development, reduces water infiltration rates, increases the difficulty of seedling emergence and establishment, and depresses vigor (Barton, et al., 1966, from Stoddart, et al., 1975). In this respect, the April 1 turnout date in some of the three-pasture systems would be likely to lead to greater adverse impacts than would a later turnout date. Due to the effects of frost-heaving, however, the immediate impacts related to surface soil compaction would be limited to the year in which the compaction occurs. A beneficial effect of trampling would be the microclimatic effect of footprints on grass seedling establishment due to the collection of runoff in the surface depressions.

The impacts of the "use" treatment are thus largely centered around reductions in forage species' carbohydrate reserves, vigor, reproduction, and competitive abilities. Due to decreased net primary production and increased consumption by herbivores, litter accumulation and canopy coverage would be reduced.

Treatment B (the "seed-ripe" year)

This treatment is provided in the three-pasture systems. It is not a part of the two-pasture system, but its effects would be partially obtained in the "use" treatment by the relatively late (July 1) turnout date. The vegetative impacts of the "seed-ripe" treatment would largely be beneficial. All vegetation would be rested until the seed-ripe date for bluebunch wheatgrass or Idaho fescue, approximately August 1. Rest would allow plants to store carbohydrate and nitrogen reserves, to increase vigor, to develop greater root systems, and to produce reproductive organs and seeds. Competitive abilities of forage species utilized during the "use" treatment would be strengthened. However, species which have not completed carbohydrate storage by the seed-ripe stage of bluebunch wheatgrass would not be as greatly benefited by the "seed-ripe" treatment and would be harmed by heavy utilization at that time. Antelope bitterbrush is such a species. Late summer through early fall is the period of most active carbohydrate storage (Garrison, 1972), and heavy grazing at that time would leave bitterbrush with lowered levels of vigor. Great Basin wildrye is the only herbaceous species known to have a seed-ripe date usually occurring later than bluebunch wheatgrass. Grazing of Great Basin wildrye in the seed-ripe treatment would not be expected to take place before its seed-ripe date, since it is relatively unpalatable.

Grazing after seed-ripe would have minimal adverse impacts on grasses, since carbohydrate reserves would be stored and the plants would not be actively growing. Grazing of regrowth due to fall rains would lower carbohydrate reserves.

Canopy coverage and litter accumulation would be reduced by grazing at this time. Some seedlings would be destroyed by trampling, but of greater importance would be the beneficial seed-planting effect that livestock would have on the vegetation. Ripened seed would be scattered and buried by the mechanical action of livestock (Sampson and Malmsten, 1926, from Stoddart, et al., 1975; Hormay and Talbot, 1961; Hormay, 1970; Stoddart, et al., 1975).

Shrubs are not as ideally suited to the "seed-ripe" treatment as grasses because considerable carbohydrate reserves are present in the woody tissue of newly produced stems. Many shrubs are still actively growing long after grasses and forbs have stopped since their deeper root systems allow exploitation of soil water available at greater depths. Thus, shrubs would provide a source of green forage in the "seed-ripe" treatment, and it is anticipated that livestock would seek out palatable species such as antelope bitterbrush at that time.

Phenology and carbohydrate reserve cycles of shrubs vary considerably with species (Garrison, 1972). Those species that accumulate carbohydrate reserves in late summer and fall, such as antelope bitterbrush (Garrison, 1972), would be adversely impacted by browsing at that time. Reproduction of bitterbrush the following year would also be hindered by browsing of newly produced leader growth, since flowering occurs on the leader growth of the previous year. Other species, such as snowberry and little rabbitbrush, are not adversely affected by late summer and fall use (Willard and McKell, 1973). The net results of browsing at that time would be related to the vigor of individual plants and the degree of utilization received (see Short-Term impacts). Nevertheless, the rest provided until that time would be highly beneficial to all plants, allowing more root development and increased vigor.

Forbs would benefit from the rest provided in this treatment but would be more susceptible to trampling damage than grasses. The net effects on perennial forbs would be anticipated to be beneficial.

Treatment C (the "rest" year)

The vegetative impacts of this treatment would be beneficial. All plants would be rested from livestock use for the entire year and would thus benefit from increased carbohydrate storage, improved root development and vigor, and reproductive success. Seedlings planted during the "seed-ripe" treatment would have opportunity for successful establishment. Forage species that benefited by rest during the "seed-ripe" treatment would be vigorous and more competitive. Canopy coverage and litter accumulation would be greatest under this treatment. Wildlife and wild horses would continue to use the "rest" pastures and prevent full benefits from being achieved on some key areas and habitat types.

SHORT-TERM IMPACTS

Short term impacts are considered as those occurring during a grazing cycle. They are the net effects of the sum of individual grazing treatments. The anticipated short-term vegetative impacts largely would be beneficial to the systematic grazing management area but would vary with habitat types and with allotments.

The theory of range improvement (trend toward climax) under rest-rotation grazing is based on the premise that periodic rest afforded to plants that are grazed will restore their vigor, thus allowing them to compete more effectively for limited resources (principally soil moisture), and regain their importance in community interrelationships. There is evidence to indicate that vegetation may recover at an even faster rate under rest-rotation grazing than under complete protection. Properly grazed plants often are as productive as, or more productive than, ungrazed plants (Nelson, 1934; Weaver and Rowland, 1952; both from Stoddart, et al., 1975); and the mechanical action of seed trample has been believed to be responsible for faster recovery rates under grazing than under complete protection (Stoddart, et al., 1975; Sampson and Malmsten, 1926, from Stoddart, et al., 1975).

"Proper" grazing has been determined with "proper-use" factors for continuous grazing; but under a rest-rotation management system, proper grazing is determined by the amount of rest needed to restore plant vigor. "The key plant in deciding the amount of rest needed is the species that needs the most rest to regain vigor after it has been completely defoliated during the critical green period. Complete defoliation must be assumed because some plants are always grazed to this degree" (Hormay, 1970). Hormay stated that usually one or two years of rest is adequate. Mueggler (1975), however, found three years of rest adequate for Idaho fescue of moderately low vigor, but five years of rest were not adequate for bluebunch wheatgrass of moderately low vigor or Idaho fescue of very low vigor. He believed that six to eight years of rest may be required for these species to recover from very low vigor. Trlica, et al. (1977), recently reported that 14 to 26 months of rest were adequate for recovery of vigor in defoliated plants of western wheatgrass, little rabbitbrush, and scarlet globemallow, but not adequate for antelope bitterbrush and fourwing saltbush.

The amount of rest required should be expected to vary with species, location, climatic factors, and history of recent use. In the study area, two years of rest during the growing season following a year of heavy use (61-80 percent utilization) appears adequate for most grasses and perennial forbs. That some vegetative species initially respond favorably to a three-treatment rest-rotation grazing system is being demonstrated within 100 miles east of the study area on the Goldbanks and Pueblo Mountain Allotments, BLM, Winnemucca District (Eckert, 1976). Vegetation, topography, and climate are similar to the study area. These allotments have been grazed since 1974 with a three-treatment grazing formula similar to that proposed for the study area, the only difference being the season of use. The grazing season on the Goldbanks Allotment begins on May 1 and the grazing season on the Pueblo Mountain Allotment begins on June 1. Key species, seedripe dates, and the ending grazing dates are similar and grazing occurs during similar periods of low carbohydrate reserves and during periods of peak carbohydrate storage. It is anticipated that vegetative response would be similar in the study area but that the rate of response might vary.

Utilization on plots in the Goldbanks Allotment averaged 69 percent during Treatment A, 75 percent during Treatment B, and 31 percent during Treatment C during 1974, 1975, and 1976. Utilization on plots in the Pueblo Mountain Allotment averaged 75 percent during Treatment A, 86 percent during Treatment B, and 38 percent during Treatment C during 1974, 1975, and 1976 (Eckert, 1976).

Although statistical analysis has not been completed on all data, the following general statements can be made: (1) it appears that there is an increase in dominant native grasses (Sandberg bluegrass, squirreltail, Idaho fescue, bluebunch wheatgrass, and Thurber needlegrass) on the Pueblo Mountain Allotment; (2) there is an increase in Sandberg bluegrass and squirreltail on the Goldbanks Allotment; (3) it appears that forb diversity and abundance have increased; (4) it appears that bare ground has decreased and vegetative cover has increased (Eckert, 1976).

Plants of low vigor and certain woody perennials may require a longer period of rest. The three-pasture rest-rotation grazing management systems would provide rest from livestock grazing during the growing season in two out of every three years for most perennial grasses and forbs. Plants maturing later than bluebunch wheatgrass or Idaho fescue would not receive the full two years rest from livestock grazing during their growing season. This would be particularly important for shrubs that replenish carbohydrate reserves during late summer and fall, such as antelope bitterbrush. Under the proposed three-pasture grazing systems these plants would be utilized by livestock during critical growth periods in two out of every three years, every other year in the two-pasture system. Thus the degree of utilization of these plants would be important. If one assumes complete defoliation, one year of rest would certainly not be sufficient. The two-pasture grazing system would provide more rest from livestock grazing to these plants than would the three-pasture systems, however the degree of utilization would also likely be greater.

The proposed three-pasture grazing system would increase grazing pressure considerably above existing levels in two out of every three years. The proposed two-pasture system would increase grazing pressure by approximately 100 percent every other year. The rest provided by the systems would be expected to benefit the major perennial grasses. Perennial forbs would also benefit but to a lesser degree, because increased livestock concentration would result in increased trampling damage. Effects on woody perennial species would be variable. Shrubs such as snowberry and little rabbitbrush would benefit; but others such as antelope bitterbrush would be adversely affected (adequate rest from livestock grazing would not be provided, and reproduction would be interfered with). Wildlife use of browse further would complicate prediction of browse response. Thus even during the "rest" treatment these species would not receive complete rest.

Aspen and willow communities would receive heavy use two out of every three years in the three-pasture systems and every other year in the two-pasture system. It is questionable whether aspen reproduction would be successful (see discussion of aspen and willow/Nevada bluegrass habitat types).

Adverse impacts would be anticipated to be greatest (and beneficial impacts least) during the initial year(s) under the proposed action. Improvement in vigor would also be lowest then. Adverse impacts would be expected to decrease and beneficial impacts to increase as the length of time following implementation of the proposed action increases.

Although a "rest" pasture would not receive the physiological equivalence of rest in a drought year as it would in a wetter year, this would not be anticipated to be a significant problem. Martin (1973) found that a spring-summer rest period two years in succession gave significantly greater yields of perennial grasses than any other rest period on a semidesert grass range; and Ratliff and Rader (1962, from Stoddart, et al., 1975) and Woolfolk (1960, from Stoddart, et al., 1975) have demonstrated that rest-rotation grazing is especially helpful in minimizing the effects of drought.

LONG-TERM IMPACTS (15 YEARS)

Long term impacts are considered as those changes in vegetation anticipated after 15 years following implementation of the proposed action. Generally speaking, range conditions would be expected to improve due primarily to increased abundance of perennial grasses. It would be unrealistic to expect site potential to be reached, with its full complement of species, under the proposed action or probably any livestock grazing management system. Although species composition may eventually be termed "excellent" range condition (assuming site potential has not been affected in the interim), the full complement of subordinate species is unlikely to be present. The less the intensity of grazing and the longer and more frequent the periods of rest (i.e., the more the effects of livestock grazing are lessened), the more closely the zootic disclimax might approach the climatic climax. However, livestock grazing is only one factor (albeit the major one) which has been introduced to or altered the normal structure and functioning of the pristine ecosystems to which the biota evolved. For this reason also, juniper invasion of some habitat types may not be decreased with changed livestock grazing management alone—fire is also a major factor in juniper ecology.

The trends described under short-term impacts would result in an increased abundance and variety of perennial forbs and variable responses from woody perennials. Shrubs which have increased as range condition has decreased, such as big sagebrush and rubber rabbitbrush, would be expected to suffer from increased grass competition. Although the abundance of these plants would probably not decrease noticeably within 15 years, their vigor would be expected to decrease appreciably. Woody forage species, whose growth requirements would be met by the grazing system (such as snowberry and little rabbitbrush) and are adapted to the site on which they occur, would be anticipated to increase. The response of other woody plants whose growth requirements for rest would not be met by the grazing systems (antelope bitterbrush, fourwing saltbush, willow, and aspen might be examples) would largely be dependent upon the degree of utilization experienced resulting from livestock and wildlife use. Under the proposed initial stocking rates, resulting in a considerable increase in grazing pressure above existing levels in the three-pasture systems and approximately a 100-percent increase in the two-pasture system, these species would be expected to be adversely impacted on the drier sites on which they presently occur and to decrease in vigor and abundance.

Vegetative responses would vary considerably with habitat type and allotment. Responses would be anticipated to be greater in habitat types that are moister than others. Presence and abundance of existing forage species and existing departures from climax would also markedly influence recovery rates.

Estimates of annual livestock forage production under present range conditions, site potentials, and anticipated range conditions after 15 years following implementation of the proposed action have been calculated for all Systematic Grazing Management Areas (TABLE 3-1) to provide a perspective of anticipated vegetative changes. Calculations were based on existing range condition data (APPENDIX F), SCS range condition guides (USDA, Soil Conservation Service, 1965), anticipated vegetative changes in each habitat type (described below), and acreages of each

TABLE 3-1

ESTIMATED LIVESTOCK FORAGE PRODUCTION IN 1976, 15 YEARS AFTER IMPLEMENTATION OF THE PROPOSED ACTION AND AT SITE POTENTIAL[1]

Allotment/Pasture	1976		1994		Potential	
Denio	2518.3	6961.8	4023.8	9115.7	4945.3	11974.5
South	754.1	2140.4	966.7	2657.2	1213.7	2939.3
North	780.3	2074.6	1307.9	2906.5	1646.9	4028.5
East	983.9	2746.8	1749.2	3552.0	2084.7	5006.7
Wall Canyon	4881.5	12427.2 2/	7625.8	16397.2 2/	14684.5	32284.7
Seeding	824.5	1655.8 2/	824.5	1655.8 2/	824.5	1655.8
East	2050.8	5260.0	3354.1	7213.7	4192.9	9699.5
West	2006.2	5511.4	3447.2	7527.7	9667.1	20929.4
Bare	20751.6	56497.4	27031.1	70771.6	46553.8	107539.9
Upper Pastures						
Hog Mountain	3896.9	12954.1	5708.6	14240.7	7714.7	18875.4
Fox Mountain	5053.5	10624.2	8855.3	19883.0	11734.8	26877.1
Clover Creek	7895.9	22396.6	5819.4	30803.6	17727.1	41326.3
Lower Pastures						
Duck Flat	1881.1	4896.5	3049.8	6955.7	4017.7	8913.6
Hover	728.8	2015.9	1286.0	2863.8	1773.8	4049.0
Old Camp	1295.4	3610.1	2312.0	5024.8	3585.7	7498.5
Lower Lake	622.5	2325.9	879.1	2962.8	2888.6	5765.3
South	222.3	936.8	299.7	1140.7	1340.3	2992.4
Middle	122.4	447.1	173.1	577.9	423.0	1025.3
North	277.8	942.0	406.3	1244.2	1125.3	1747.6
Duck Lake	5191.5	16655.4	9538.8	22637.7	14483.1	32168.9
North	1388.9	4755.1	3012.9	6678.3	4183.7	9300.2
West	1472.2	4586.5	2381.7	5869.0	4041.0	8810.3
East	2330.4	7313.8	4144.2	10090.4	6258.4	14058.4
Home Camp	17936.7	46477.1	28600.4	61570.7	37365.8	83818.2
Hayes Canyon	3608.3	10609.8	6176.9	14625.7	9657.1	23459.3
Hart Camp	8764.8	21189.9	12674.9	26905.6	15468.4	33740.6
Grass Lake	5563.6	14677.4	9748.6	20039.4	12240.3	26618.3
Selic-Alaska Canyon	1579.7	4716.8	4974.5	6600.2	3807.6	6355.9
East	761.5	2342.3	1367.3	3232.4	1868.4	4409.5
West	818.2	2374.5	3607.2	3367.8	1939.2	1946.6
Tuledad	15959.1	54369.0	27187.2	68100.0	40224.6	100059.4
Coppersmith	4747.9	15452.6	7549.0	19907.7	11814.6	32299.9
Cottonwood	7110.5	24436.5	12382.4	28875.7	17086.0	40466.0
Bare Creek	4100.7	14479.9	7255.8	19316.6	11324.0	27293.5
Systematic Grazing Management Area Subtotal	69440.9	200430.6	10986.7	266155.9	164953.3	379966.8
Corral	139.8	406.8	3/		386.3	943.4
Highway	78.4	242.5	3/		231.7	496.8
Cold Springs Mountain	32.3	114.5	3/		85.5	200.1
Cedar	32.0	88.3	3/		73.1	182.9
Boot Lake	95.0	218.3	3/		180.1	448.9
State Line	3.4	27.1	3/		73.3	179.9
Clarks Valley	6.5	25.2	3/		18.8	44.5
Red Rock	165.5	460.7	3/		386.3	943.4
Study Area Total	69993.8	202014.0	109860.7	266155.9	166250.6	383174.0

1/ Units are 1,000 lbs. of forage produced per year. No implications regarding amount of forage available to livestock or wildlife are intended.

2/ Assumes that crested wheatgrass seeding produces livestock forage at the rate of site potential.

3/ Future production will depend upon livestock management elected by individual operators in these areas.

habitat type in each pasture (APPENDIX F, TABLE F-1). Cattle animal unit months (AUMs), an expression of forage production used in the SCS range condition guides, were converted to pounds of livestock forage produced to avoid confusion between forage production and grazing capacities. Forage production expressed in AUMs tends to imply grazing capacities which cannot be determined for a different type of grazing management system. A conversion factor of 1,600 pounds of livestock forage produced per AUM was used, based on assumptions that 800 pounds of forage are required to maintain one AUM and that, under continuous grazing and the "take half, leave half" philosophy, approximately 1,600 pounds of forage must be produced to maintain one AUM.

The total herbage production of allotments shown on TABLE 1-7 and individual habitat types shown on TABLE 2-3 would not change after implementation of the proposed action. Production of individual species, however, would change with a corresponding change in species composition. For example, if a habitat type were to change condition class, production of sagebrush might decline but an offsetting amount of bluebunch wheatgrass might be produced, resulting in the same total production. If the successional stage of a community is extremely low, the genetic capabilities of plant species present might limit total production (Sellers, 1977).

Estimates of total annual herbage production on grazing exclusion areas is shown on TABLE 3-2.

THREE-PASTURE VERSUS TWO-PASTURE SYSTEMS

Two-pasture systems have generally not been recommended by proponents of rest-rotation grazing management. However, the relatively late turnout date of July 1 would greatly enhance the chances of success of the proposed system. Although carbohydrate reserves in perennial grasses would be very low at that time, root development would be nearly completed (based on data for Idaho fescue presented by Hormay and Talbot, 1961; Troughton, 1957; and McCarty and Price, 1951; all from Hormay, 1970), thus enabling higher recovery rates following grazing. Reproduction would be interfered with during the "use" treatment, but all the forage could not be consumed at once, and the "use" treatment would have the effects of the three-pasture "seed-ripe" treatment on grasses not grazed until after seed-ripe. A competitive advantage would be confined to those species with early seed-ripe dates, such as Sandberg bluegrass and squirreltail.

Response would be anticipated to be slower in the two-pasture than the three-pasture systems. Rest would be provided for grasses in two out of every three years in the latter systems and only every other year in the former. Early maturing grasses and forbs would benefit more than later maturing species in the two-pasture system, and the effects on aspen reproduction would be questionable. Specific anticipated impacts of the two-pasture system are addressed in the discussion of the Selic-Alaska Canyon Allotment.

HABITAT TYPES

Anticipated vegetative changes were based on present range condition and trend data (APPENDIX F), presence and abundance of forage species, and soil moisture relations of each habitat type. It is believed that under the proposed action the condition of most habitat types presently not significantly different from most of those in the next higher condition class (APPENDIX F) would be sufficiently improved to raise their condition to that of the higher condition classification (e.g., "fair" to "good"), unless soil moisture conditions or species composition would indicate otherwise (TABLE 3-3). Range condition would be expected to initially increase very slowly. However, the rate of improvement will increase with time (FIGURE 3-1). A general increase in the abundance of perennial grasses and forbs would be anticipated to occur within 15 years. Early maturing species, such as Sandberg bluegrass and squirreltail, would show the most immediate responses. A much longer period of time would be required to restore vigor and abundance of the later maturing species such as bluebunch wheatgrass and Idaho fescue. Although the vigor of shrubs would decrease as a result of intensified competition with grasses, no appreciable reductions in shrub densities due to increased herbaceous competition alone would be expected within such a short time.

Shadscale/Indian Ricegrass Habitat Type (*HT–4*)

No noticeable vegetative response would be anticipated for the shadscale/Indian ricegrass habitat type. The soils are very dry and herbaceous vegetation is extremely sparse. Although an upward trend would be anticipated, the rate of recovery would be very slow. The range condition

TABLE 3-2

ESTIMATED TOTAL ANNUAL HERBAGE PRODUCTION
ON GRAZING EXCLUSION AREAS 1/

Area	Less Favorable Years	Favorable Years
Garden Lake 2/	variable	variable
Grass Lake 2/	variable	variable
Red Rock Lake 2/	variable	variable
Snake Lake 2/	variable	variable
Bare Creek	235	433
Barber Creek	21	38
Cottonwood Creek	140	266
Selic Creek	8	12
Alaska Creek	6	9
Emerson Creek	229	456
Aspen Stand 3/	unknown	unknown
Meadows	49	88
Springs	76	114
Reservoirs	10	19
Bicondoa	3,581	7,563
Lower Lake	276	504
North Tuledad	156	275
TOTAL	4,787	9,777

1/ Figures are in 1,000 pounds of air dry herbage.

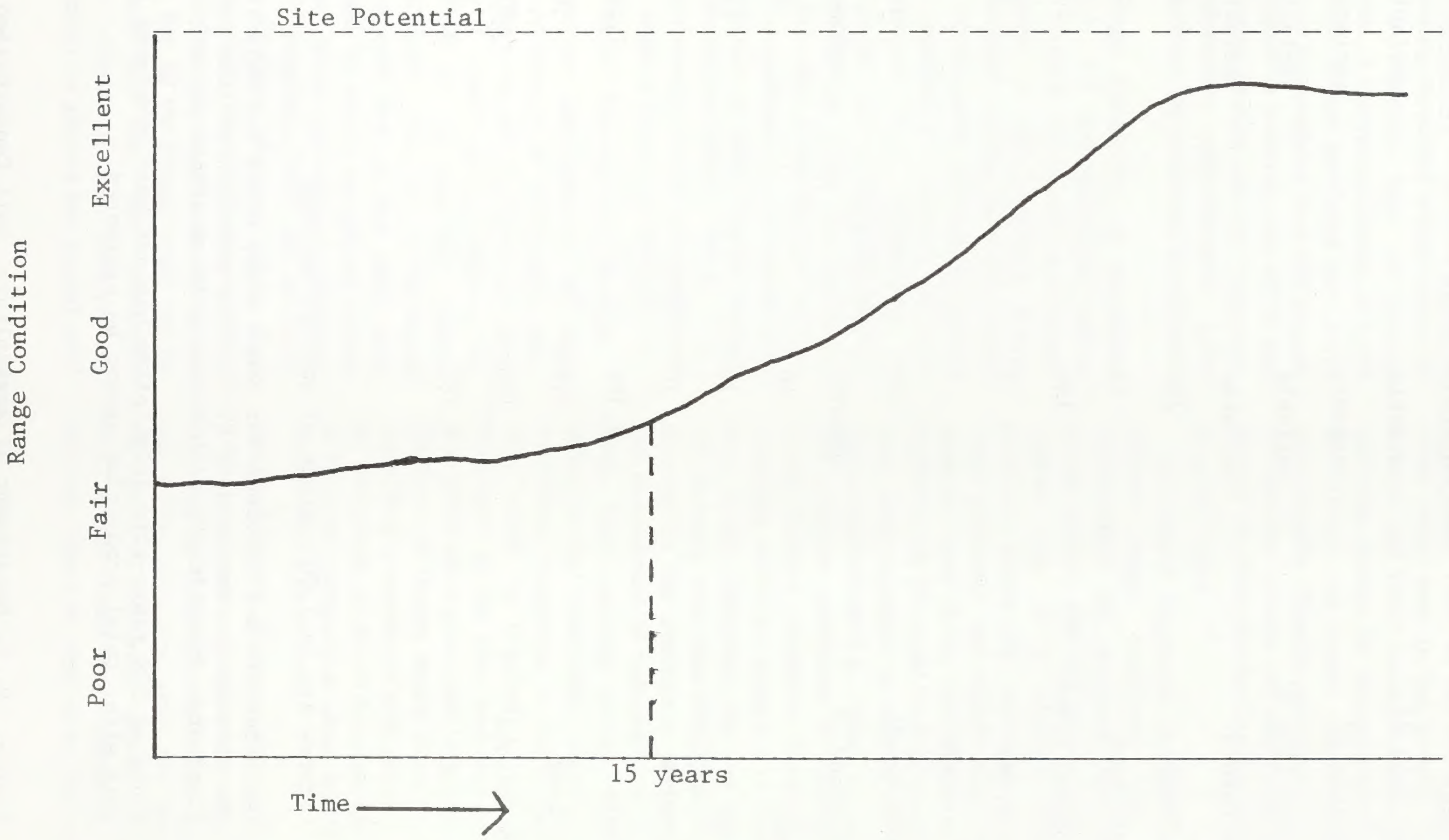
2/ Estimates are not provided for these areas since the majority of the acreage is comprised of HT-23 and production of this type fluctuates dramatically with seasonal fluctuations in water levels.

3/ Since an SCS range-site description has not been developed for this site, total production cannot be estimated.

Source: U. S. Department of Agriculture, Soil Conservation Service, "Range Site Descriptions and Range Condition Guide," 1965.

FIGURE 3-1

HYPOTHETICAL RELATIONSHIP BETWEEN IMPROVEMENT IN RANGE CONDITION AND TIME UNDER THE PROPOSED ACTION [1]



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[1] The exact location of the 15-year time period is not known. The length of time required to reach "excellent" condition would be highly variable but largely dependent upon soil moisture availability, present species composition, and degree of use by livestock, wildlife, and wild horses.

TABLE 3-3
SUMMARY OF EXPECTED VEGETATIVE RESPONSE TO THE PROPOSED ACTION

Habitat Type	Degree of Response	Species Showing Greatest Response	Factors Most Responsible For Degree of Response	Existing Range Condition	Anticipated Range Condition After 15 Years
shadscale/Indian rice-grass (HT-4)	Low	Indian rice grass, squirreltail	low soil moisture, present species composition	Fair	Fair
shadscale-big sage (HT-12)	Moderate	squirreltail	present species composition	Fair	Good
greasewood/Great Basin wildrye (HT-2)	Low	bluegrasses, squirreltail	low soil moisture, present species composition	Fair	Fair
greasewood/saltgrass (HT-10)	Low	saltgrass	low soil moisture, present species composition	Poor	Poor
low sage/Sandberg-bluegrass (HT-8)	No Data	perennial grasses	No Data	No Data	No Data
low sage/bluegrass-squirreltail (HT-21)	Low	Thurber needlegrass, bluebunch wheatgrass	present species composition	Excellent	Excellent
low sage/Idaho fescue-Sandberg bluegrass (HT-14)	Moderate	bluegrasses, Idaho fescue, perennial forbs	present species composition	Fair	Good
low sage-rabbitbrush (HT-1)	Low	bluegrasses, squirreltail, perennial forbs	present species composition	Fair	Fair
low sage/Idaho fescue (HT-17)	High	bluegrasses, squirreltail, Idaho fescue, perennial forbs	high soil moisture, present species composition	Fair	Good
big sage/Indian ricegrass (HT-11)	Moderate	Indian ricegrass, squirreltail	present species composition	Fair	Good
big sage/squirreltail-Indian ricegrass (HT-6)	Moderate	squirreltail, Indian ricegrass	present species composition	Fair	Good
big sage/Great Basin wildrye (HT-5)	Moderate	squirreltail, bluegrasses perennial forbs	present species composition	Fair	Good
big sage/bluebunch wheatgrass (HT-20)	Moderate	Idaho fescue, bluebunch wheatgrass	present species composition	Fair	Good
big sage/bluebunch wheatgrass - Great Basin wildrye (HT-18)	Low	perennial forbs, bluebunch wheatgrass	present species composition	Fair	Fair
big sage/bluebunch wheatgrass - Thurber needlegrass (HT-16)	Moderate	bluebunch wheatgrass, Idaho fescue, perennial forbs	present species composition	Fair	Good
bitterbrush-big sage/ (HT-15)	Moderate	Idaho fescue, bluebunch wheatgrass, perennial forbs	present species composition	Fair	Good
juniper/big sage/ bluebunch wheatgrass (HT-24)	Moderate	bluebunch wheatgrass, Idaho fescue, perennial forbs	present species composition	Fair	Good
bitterbrush-big sage/ bluebunch wheatgrass Idaho fescue (HT-22)	No Data	perennial grasses and forbs	No Data	No Data	No data
big sage/Idaho fescue (HT-7)	Moderate	Idaho fescue, bluebunch wheatgrass, perennial forbs	high soil moisture, present species composition	Fair	Good
big sage-snowberry/ Idaho fescue (HT-19)	High	Idaho fescue, bluebunch wheatgrass, perennial forbs	high soil moisture, present species composition	Fair	Good
big sage-silver sage/ Great Basin wildrye (HT-9)	Moderate	sedges, bluegrasses, Great Basin wildrye	high soil moisture, present species composition	Poor	Fair
curlleaf mountain mahogany/big sage/ Idaho fescue (HT-25)	Moderate	Idaho fescue, bluebunch wheatgrass	high soil moisture, present species composition	No Data	Good
silver,sage/Nevada bluegrass (HT-3)	Moderate	mat muhly, squirreltail, perennial forbs	high soil moisture, present species composition	Fair	Good
baltic rush (HT-23)	Low	No Change	periodic inundation, high resistance to grazing	No Data	Same
aspen (HT-26)	Low	blue wildrye, mountain brome aspen	soil moisture, present species composition changes in range use patterns of deer sheep herding skill	Poor	Poor
willow/Nevada blue-grass (HT-27)	High (no change)	bluegrasses, sedges	high soil, moisture, (low soil moisture, present species composition)	Fair (Poor)	Good (Poor)
Nevada bluegrass-sedge (HT-13)	High	bluegrasses, sedges	high soil moisture	Fair	Good
white fir (HT-28)	Low	No Change	lack of livestock use	Excellent	Excellent

would still be "fair" after 15 years under the proposed action.

Shadscale-Big Sage Habitat Type (HT–12)

The shadscale-big sage habitat type would be expected to show some noticeable responses. Although the soils are dry and herbaceous vegetation is sparse, squirreltail is a component of some stands and would be expected to increase in abundance. The range condition of this habitat type would be expected to be "good" within 15 years following implementation of the proposed action.

Greasewood/Great Basin Wildrye Habitat Type (HT–2)

No appreciable vegetative response would be anticipated for the greasewood/Great Basin wildrye habitat type. The soils are dry and perennial herbaceous species are sparse. Potential rate of response would be limited by vesicular soil surface layers. An upward trend would be anticipated with squirreltail showing some response, but the range condition of this habitat type would still be "fair" after 15 years under the proposed action.

Greasewood/Saltgrass Habitat Type (HT–10)

No noticeable vegetative response would be anticipated for the greasewood/saltgrass habitat type. Soils are very physiologically dry due to their high salt concentrations and herbaceous vegetation is sparse. Although an upward trend would be anticipated, the rate of recovery would be very slow. The range condition would still be "poor" after 15 years under the proposed action.

Low Sage/Sandberg Bluegrass Habitat Type (HT–8)

Although the low sage/Sandberg bluegrass habitat type occurs only on privately owned land, it nevertheless would be impacted by the proposed action. Specific impacts could not be anticipated without current (1977) vegetative data, but perennial grasses and forbs would generally be expected to benefit.

Low Sage/Bluegrass-Squirreltail Habitat Type (HT–21)

The low sage/bluegrass-squirreltail habitat type is already in "excellent" condition. Some perennial grasses, such as Thurber needlegrass and bluebunch wheatgrass, and forbs which are not presently common components of this habitat type might be anticipated to become more evident. However, the potential for improvement in range condition is slight, and no noticeable changes would be anticipated within 15 years following implementation of the proposed action.

Low Sage/Idaho Fescue-Sandberg Bluegrass Habitat Type (HT–14)

The low sage/Idaho fescue-Sandberg bluegrass habitat type would be expected to demonstrate noticeable improvement in range condition. The soils are relatively dry, but herbaceous species comprise about 40 percent of the vegetation. Bluegrasses would be anticipated to show the most immediate responses, but Idaho fescue and perennial forbs would be expected to show the greatest long-term increases in abundance. The range condition of this habitat type would be expected to be "good" within 15 years under the proposed action.

Low Sage-Rabbitbrush Habitat Type (HT–1)

The low sage-rabbitbrush habitat type would be expected to show an increase in bluegrass, squirreltail, and perennial forbs. Changes in shrub composition would not be anticipated to result from changed grazing management. Despite the increase in perennial herbaceous species, range condition of this habitat type would be expected to remain in the "fair" condition class after 15 years under the proposed action.

Low Sage/Idaho Fescue Habitat Type (HT–17)

The low sage/Idaho fescue habitat type would be expected to show considerable improvement in range condition. The soils are relatively moist for low sagebrush associations, and about 55 percent of the vegetation is composed of herbaceous species. Bluegrasses, squirreltail, Idaho fescue, and perennial forbs would be expected to show the greatest increases in abundance. The range condition of this habitat type would be anticipated to be "good" within 15 years following implementation of the proposed action.

Big Sage/Indian Ricegrass Habitat Type (HT–11)

The big sage/Indian ricegrass habitat type would be expected to demonstrate improvement in range condition, despite the relatively dry soil and shifting surface sands. Minor amounts of Indian ricegrass and squirreltail are present in many stands and would be expected to increase in abundance. The range condition of this habitat type would be anticipated to be "good" within 15 years following implementation of the proposed action.

Big Sage/Squirreltail-Indian Ricegrass Habitat Type (HT–6)

The big sage/squirreltail-Indian ricegrass habitat type would be expected to show noticeable improvement in range condition. Although the soils are relatively dry, squirreltail is a component of most stands, and Indian ricegrass has not been eliminated. These species would be anticipated to increase in abundance. The range condition of this habitat type would be expected to be "good" within 15 years following implementation of the proposed action.

Big Sage/Great Basin Wildrye Habitat Type (HT–5)

The big sage/Great Basin wildrye habitat type would be expected to show noticeable improvement in range condition. The soils are moderately moist to moist during spring and early summer and would be conducive to the reestablishment of perennial grasses. Greatest responses would be anticipated in squirreltail. Great Basin wildrye would also be expected to respond favorably. Although only trace amounts of bluegrasses and perennial forbs presently exist in this habitat type, their abundance would also be expected to increase. The range condition of this habitat type would be expected to be "good" within 15 years following implementation of the proposed action.

Big Sage/Bluebunch Wheatgrass Habitat Type (HT–20)

The big sage/bluebunch wheatgrass habitat type would be expected to show noticeable improvement in range condition. The soils are moderately moist, and the potential for improvement is great. Although bluegrasses and squirreltail would be expected to show the most immediate responses, Idaho fescue and bluebunch wheatgrass would be anticipated to show the greatest long-term responses. Many perennial forbs which presently occur in only trace amounts would also be expected to become more abundant. The range condition of this habitat type would be anticipated to be "good" within 15 years following implementation of the proposed action.

Big Sage/Bluebunch Wheatgrass-Great Basin Wildrye Habitat Type (HT–18)

The big sage/bluebunch wheatgrass-Great Basin wildrye habitat type would be expected to show improvement in range condition, but at a rather slow rate during the initial 15-year period. The association dominants such as bluebunch wheatgrass and Great Basin wildrye are very sparse at the present time. Cheatgrass dominates the herbaceous vegetation of most stands. Some increase in perennial forbs would be anticipated, but overall the improvement in range condition would not be expected to be sufficiently great to change the range condition classification of this habitat type from "fair" within 15 years following implementation of the proposed action.

Big Sage/Bluebunch Wheatgrass-Thurber Needlegrass Habitat Type (HT–16)

The big sage/bluebunch wheatgrass-Thurber needlegrass habitat type would be expected to show noticeable improvement in range condition. Soils are relatively moist and the potential for improvement is considerable. Although squirreltail and bluegrass would be expected to demonstrate the most immediate responses, the greatest long-term responses would be anticipated to come from bluebunch wheatgrass, Idaho fescue, and perennial forbs such as phlox. Indian ricegrass might also increase to a limited extent. Thurber needlegrass is presently exceedingly rare or not at all present in most stands, and therefore would not be expected to become a conspicuous component of most communities for a considerably longer time to come. The range condition of this habitat type would be expected to be "good" after 15 years under the proposed action.

Bitterbrush-Big Sage/Bluebunch Wheatgrass Habitat Type (HT–15)

The bitterbrush-big sage/bluebunch wheatgrass habitat type would be expected to show noticeable improvement in range condition. Soils are relatively moist and potential for improvement is good. The most immediate responses would be expected from bluegrasses and squirreltail, but Idaho fescue, bluebunch wheatgrass, and perennial forbs would be expected to show the greatest long-term responses. Thurber needlegrass would also be expected to become more abundant in most stands. Bitterbrush would be expected to be adversely impacted under the proposed action. Sufficient rest would not be provided for restoration of vigor. Anticipated impacts on bitterbrush are addressed in more detail in the discussion of individual allotments. The range condition of this habitat type would be expected to be "good" within 15 years following implementation of the proposed action.

Juniper/Big Sage/Bluebunch Wheatgrass Habitat Type (HT–24)

The juniper/big sage/bluebunch wheatgrass habitat type would be expected to show noticeable improvement in range condition. Soils are relatively moist and the potential for improvement is good. Although bluegrasses and squirreltail would be expected to show the most immediate responses, bluebunch wheatgrass, Idaho fescue, and perennial forbs would be anticipated to show the greatest long-term responses. Great Basin wildrye would also increase in some communities. The range condition of this habitat type would be expected to be "good" within 15 years following implementations of the proposed action.

Bitterbrush-Big Sage/Bluebunch Wheatgrass-Idaho Fescue Habitat Type (HT–22)

Although the bitterbrush-big sage/bluebunch wheatgrass-Idaho fescue habitat type occurs only on privately owned lands, it nevertheless would be impacted by the proposed action. Specific impacts cannot be anticipated without current vegetation data, but perennial grasses and forbs would generally be expected to benefit.

Big Sage/Idaho Fescue Habitat Type (HT–7)

The big sage/Idaho fescue habitat would be expected to show noticeable improvement in range condition. Soils are relatively moist and the potential for improvement is good. Although bluegrasses and squirreltail would be expected to show the most immediate responses, Idaho fescue, bluebunch wheatgrass, and perennial forbs would be expected to show the greatest long-term responses. Mountain brome and needlegrasses would become more evident in many communities. Bitterbrush would be anticipated to decrease slightly or maintain its present status. The range condition of this habitat type would be expected to be "good" within 15 years following implementation of the proposed action.

Big Sage-Snowberry/Idaho Fescue Habitat Type (HT–19)

The big sage-snowberry/Idaho fescue habitat type would be expected to show noticeable improvement in range condition. Soils are relatively moist and potential for improvement is good. Idaho fescue, bluebunch wheatgrass, and perennial forbs would be expected to show the greatest long-term responses. Mountain brome and needlegrasses would also become more abundant in some communities. The range condition of this habitat type would be expected to be "good" within 15 years following implementation of the proposed action.

Big Sage-Silver Sage/Great Basin Wildrye Habitat Type (HT–9)

The big sage-silver sage/Great Basin wildrye habitat type would be expected to show noticeable improvement in range condition. Although soils are quite moist, sun-baked surface soils would retard improvement rates. Great Basin wildrye would be expected to increase in most communities. Sedges and bluegrasses would show the greatest initial responses. The range condition of this habitat type would be expected to be "fair" within 15 years following implementation of the proposed action.

Curlleaf Mountain Mahogany/Big Sage/Idaho Fescue Habitat Type (HT–25)

The curlleaf mountain mahogany/big sage/Idaho fescue habitat type would be expected to show responses similar to those of the big sage/Idaho fescue habitat type. Soils are relatively moist, and potential for improvement is good. Squirreltail, bluegrasses, and perennial forbs would be anticipated to increase initially. Idaho fescue, bluebunch wheatgrass, and needlegrass would be slower to respond but would eventually show the greatest responses. Successful reproduction of mountain mahogany in and around rocky outcroppings would be anticipated. Reproduction might initially be successful in big sage/Idaho fescue communities where mountain mahogany has invaded, but seedling success would not be anticipated in these stands once the perennial grasses have recovered. The range condition of this habitat type would be expected to be "good" within 15 years following implementation of the proposed action.

Silver Sage/Nevada Bluegrass Habitat Type (HT–3)

The silver sage/Nevada bluegrass habitat type would be expected to demonstrate improvement in range condition. Soils are very wet during spring and are favorable for reestablishment of herbaceous species during early summer. Mat muhly, squirreltail, western wheatgrass, and perennial forbs would be expected to increase in abundance. The range condition of this habitat type would be expected to be "good" within 15 years following implementation of the proposed action.

Baltic Rush Habitat Type (HT–23)

The baltic rush habitat type is relatively unaffected by grazing and would not be expected to show any successional response to the proposed action.

Aspen Habitat Type (HT–26)

Condition of the aspen habitat type would be anticipated to improve only slightly. Although soils are relatively moist, the perennial forbs characteristic of climax aspen understories have largely been eliminated. Livestock would continue to concentrate in aspen communities during both the "use" and the "seed-ripe" treatments, resulting in heavy grazing pressure and trampling damage to young plants. Due to cooler temperatures, less sunlight, and extended soil moisture availability, seed-ripe usually occurs at a later date in aspen understories than in adjacent shrub-dominated communities. Thus, this habitat type would not receive the full benefits of the "seed-ripe" treatment. Heavy livestock concentrations in two of every three years (every other year in the two-pasture system) would continue to impair aspen reproduction. Grazing injury to aspen sprouts has long been known to be proportional to grazing intensity (Baker, 1918; Sampson, 1919); and exceedingly light grazing by sheep, moderate grazing by cattle, or protection for sufficient periods have been recommended for successful aspen regeneration (Sampson, 1919). At least three successive years of protection has been recommended by Sampson (1919). The U.S. Forest Service (1970) recommends three years' protection from sheep and five years' protection from cattle. However, aspen reproduction has been observed to be successful under three-pasture rest-rotation grazing systems on similar ranges, where under continuous grazing successful reproduction had been nil (Cozakos, 1976, pers. comm.; A. L. Hormay, 1976, pers. comm.) The periodic rest afforded by the systems has apparently been sufficient to overcome the repeated browsing that occurs during "use" and "seed-ripe" treatments. Thus, aspen reproductive success would be anticipated to be improved in at least the most moist sites, but success would be highly questionable and would not be anticipated in the drier communities.

Willow/Nevada Bluegrass Habitat Type (HT–27)

The willow/Nevada bluegrass habitat type would be expected to show improvement in range condition. Soil moisture conditions and species composition are extremely favorable for improvement in those communities where willows are still conspicuous components of the vegetation. Greatest and most immediate responses would be anticipated in the herbaceous species, most notably in bluegrasses and sedges. These communities would serve as concentration areas for livestock in both the "use" and "seed-ripe" treatments, but the rest afforded in the "rest" and first half of the "seed-ripe" treatments would be sufficient for herbaceous species and overall improvement in range condition. Although willow root sprouts would be browsed by livestock during both the "use" and "seed-ripe" treatments, vigorous root development during the periods of rest would be anticipated to result in a slight net beneficial effect. Experience with rest-rotation grazing systems in Montana (Cosgriffe, 1977, pers. comm.; Whitmer, 1971) and Oregon (Majors, 1977, pers. comm.) has been that willows respond favorably to such treatment. Range condition of the willow-dominated communities of this habitat type would be expected to improve from "fair" to "good" within 15 years following implementation of the proposed action. Severely deteriorated communities, where water tables have been lowered, would not be expected to show improvement during this period of time.

Nevada Bluegrass-sedge Habitat Type (HT–13)

The Nevada bluegrass-sedge habitat type would be expected to show very noticeable improvement in range condition. Soil moisture conditions and species composition are extremely favorable for improvement in those communities where head-cutting has not lowered the water table. Bluegrasses and sedges would be expected to show the greatest responses. Increased abundance and diversity of perennial forbs would also be anticipated. Despite heavy use of these communities during both the "use" and "seed-ripe" treatments, the net effect of rest-rotation grazing would be anticipated to be beneficial. The range condition of this habitat type would be expected to be "good" within 15 years following implementation of the proposed action.

White Fir Habitat Type (HT–28)

Vegetation of the white fir habitat type would not be anticipated to show a significant response to the proposed action. Very little forage is presently (1977) available in this habitat type, and it is seldom used by livestock. Use would be anticipated to increase in the forest edges during the "use" year, but no net effect on the habitat type would be anticipated.

LIVESTOCK GRAZING ALLOTMENTS

Impacts of the proposed action would be expected to vary with allotments and pastures within allotments. Although the vegetative responses would generally be as described above, certain exceptions would be anticipated and are addressed below.

Denio Allotment

Vegetative responses in the Denio Allotment would be anticipated to generally be as described in the discussion of habitat types. Response rate would be expected to be lowest in the South pasture, however, due to the preponderance of the big sage/squirreltail-Indian rice grass and low sage/bluegrass-squirreltail habitat types in that pasture and the preponderance of the big sage/Idaho fescue habitat type in the East and West pastures. The use of Idaho fescue for a key species seed-ripe date is comparable to using bluebunch wheatgrass, since seed-ripe dates are similar for both species.

Wall Canyon Allotment

The crested wheatgrass seeding in the Wall Canyon Allotment would be expected to benefit from the proposed action. The use of crested wheatgrass as the key species for the seed-ripe date in that pasture would assure that its growth requirements would be met. Vegetative responses of the East and West pastures would be anticipated to be as described above in the discussion of habitat types. Rates of response would be anticipated to be similar in both of these pastures.

Bare Allotment

The lower three-pasture grazing system of the Bare Allotment would be expected to show a slow rate of recovery within 15 years following implementation of the proposed action due to the preponderance of big sage/squirreltail-Indian ricegrass and shadscale-big sage habitat types within the Duck Flat and Hoover Ranch pastures. The Old Camp pasture, however, would be expected to respond faster than the other two pastures due to the preponderance of the big sage/bluebunch wheatgrass habitat type there. Much greater response would be anticipated in the upper three-pasture system, where the big sage/Idaho fescue and big sage/ bluebunch wheatgrass habitat types comprise much of the area. The big sage/bluebunch wheatgrass-Thurber needlegrass habitat type in the Fox Mountain and Clover Creek pastures would also be expected to show very noticeable improvement in range condition. The lower areas of the Clover Creek and Hog Mountain pastures, however, would be expected to improve slowly. These are chiefly low sage/squirreltail-Indian ricegrass habitat types.

Much of the Hog Mountain pasture is low sage/bluegrass-squirreltail habitat type where range condition is already "excellent" and rate of improvement would be expected to be very slow. However, analysis of this pasture is complicated by the presence of a wild horse herd. Horses would not be rotated in the grazing system and, therefore, would continue to exert grazing pressure on this pasture during the "rest" year. Recovery of perennial grasses would therefore not be anticipated in those areas preferred by wild horses (see Chapter 2, Wild Horses, and MAP 2–13).

Lower Lake Allotment

Big sage/squirreltail-Indian ricegrass and greasewood/Great Basin wildrye habitat types comprise most of the rangeland in the Lower Lake Allotment and the potential rate of improvement would be very low in both. Relatively high potential rate of improvement exists in the big sage/Idaho fescue habitat type that occurs in the North and Middle pastures. Much of this allotment is rubbleland and would not be expected to be affected by the proposed action.

Duck Lake Allotment

Vegetative responses in the Duck Lake Allotment would be expected to be much the same as described in the discussion of habitat types. Potential for improvement in range condition is very low in much of the East and West pastures, since shadscale-big sage and greasewood/Great Basin wildrye habitat types comprise much of the area. Improvement would be anticipated to be greatest in the big sage/bluebunch wheatgrass and big sage/Idaho fescue habitat types located in the eastern portion of the North and East pastures.

The rate of improvement in all pastures would be considerably lower than that of the same habitat types in other allotments, however, due to the relatively early grazing season proposed for the Duck Lake Allotment. The seed-ripe date of bluebunch wheatgrass generally occurs around August 1. Since the season of use would end on August 15 in the Duck Lake Allotment, essentially all use would be confined to the "use" treatment and no "seed-ripe" treatment would be provided.

Home Camp Allotment

Vegetative responses in the Home Camp Allotment would be expected to be much the same as described in the discussion of habitat types. The Hays Canyon pasture would be expected to show the most rapid rate of improvement, since big sage/Idaho fescue and low sage/Idaho fescue habitat types comprise most of the area, and very few livestock distribution problems would be anticipated in this pasture. Less rapid improvement would be expected in the Grass Lake and Hart Camp pastures due to lower potentials for improvement and to livestock distribution problems related to water sources. Aspen communities would be expected to continue to deteriorate in this allotment.

Selic-Alaska Canyon Allotment

Analysis of vegetative responses in the Selic-Alaska Canyon Allotment is complicated by several factors. The potential for range improvement is very high, since big sage/Idaho fescue and big sage-snowberry/Idaho fescue habitat types comprise the majority of the allotment. Aspen communities are extensive, and the willow/Nevada bluegrass habitat type occurs along the bottoms of the major drainages. A two-pasture system, however, would be expected to show much slower responses than a three-pasture system; and both cattle and sheep would use this allotment. The overall impacts would be anticipated to be beneficial, though at much lower rates than are potentially possible. The July 1 turnout date would allow all species to get a good start on the growing season, but climax-dominant grasses (Idaho fescue, bluebunch wheatgrass, Thurber needlegrass, Great Basin wildrye) would be in an active stage of growth at that time, and reproduction and carbohydrate storage would be impaired by grazing. Some seed-ripening and trampling, however, would be anticipated. Within 15 years following implementation of the proposed action, increases in Idaho fescue and bluebunch wheatgrass would be expected to be noticeable except in the most easily accessible areas, which would show marked increases in bluegrasses and squirreltail. Perennial forbs would also be anticipated to increase, but at a very slow rate.

The impacts on palatable shrubs, such as antelope bitterbrush, would be expected to be adverse, the degree of which will largely depend upon sheep and deer patterns of use. Aspen communities would be expected to continue to deteriorate. Sheep are notoriously harmful to aspen root sprouts (Baker, 1918; Sampson, 1919). Aspen understory would be expected to show an increase in the abundance of perennial grasses such as bluegrasses, blue wildrye, and mountain brome, but no increase in perennial forbs would be anticipated.

Tuledad Allotment

Analysis of vegetative impacts in the Tuledad Allotment is complicated by several factors. A wide elevational range and varied topography result in great diversity of habitat types. Both cattle and sheep use the allotment. Relatively large populations of mule deer and wild horses are yearlong residents. A sizeable antelope herd competes for available forage. Demands on the forage resource are thus greater and more complicated in this allotment than in any other in the study area.

The benefits of periodic rest from livestock grazing and seed trample would still be operative in this allotment but would be greatly affected in a highly localized manner by wildlife responses in range use patterns. Preferred habitat of wild horses would not receive rest during either the "rest" or "seed-ripe" treatments and therefore would be expected to be adversely affected by the proposed action. Areas most severely impacted in this respect would be the SOB-Garden-Willow Lakes areas of the Cottonwood pasture and the Coppersmith Hills area of the Coppersmith pasture. The former is also used heavily by antelope each spring. Impacts on the aspen habitat type would be anticipated to vary from stand to stand. Forb reestablishment in the understory would not be expected, though perennial grasses such as bluegrasses, blue wildrye, and mountain brome would increase. Success of aspen reproduction would be related to soil moisture availability, sheepherding skill, and degree of browsing pressure exercised by deer during "rest" periods. Reproduction success would be anticipated to be poor or nil in most stands. Similar responses would be anticipated for antelope bitterbrush. The majority of the rangeland, however, would be expected to show noticeable improvement in perennial grasses within 15 years following implementation of the proposed action. The Bare Creek pasture would be expected to show the greatest rate of improvement due to the large proportion of big sage/Idaho fescue and low sage/Idaho fescue habitat types.

Custodial Management

Custodial grazing management would affect 4,860 acres, less than 1 percent of the study area. Continuous grazing would be expected to continue in these areas. No changes in vegetation would be anticipated in the Red Rock Allotment because no changes in grazing management would take place under the proposed action. Responses in the other allotments, however, would vary with management elected by individual operators. Lack of data at the present time precludes the ability to make further predictions for these areas.

Grazing Exclusions

Grazing exclusions would affect 18,920 acres, about 2 percent of the study area. The vegetative impacts would be expected to be beneficial in all grazing exclusion areas. Vigor of previously grazed plants at a competitive disadvantage in community interrelationships would increase as these plants are released from the effects of livestock grazing. Vigor of plants previously benefiting from the grazing-induced reduction of vigor of competing species would decrease. The net effect would be an improvement (trend toward climax) in range conditions.

Improvement would be most evident in the most moist habitat types (especially evident in the willow/Nevada bluegrass and aspen habitat types). However, species reproducing by seed would not receive the beneficial trampling effects of livestock. Thus, although vigor of individuals of forage species would increase greatly, the increase in density (number of individuals per unit area) would not be correspondingly as high for those species reproducing primarily by seed.

The rate of vegetative recovery of a given community would be primarily dependent upon the vigor levels of individuals and species composition (range condition) of the community at the time of exclusion, availability of soil moisture during exclusion, and reproductive strategies of the particular species involved. Rates of recovery would be greatest initially in the willow/Nevada bluegrass and aspen habitat types where response from willows and aspen (both are root-sprouters) would be especially evident. Rate of recovery in these more moist habitats would decrease from the initial "bloom," however, and would be less during the last five years than during the initial five years of the 15-year period following implementation of the proposed action. Recovery rates in the drier habitat types would be lowest initially and would gradually increase with time.

The greasewood/saltgrass habitat type would be expected to remain in "poor" condition; the shadscale/Indian ricegrass, greasewood/Great Basin wildrye, and low sage-rabbitbrush habitat types in "fair" condition; and the low sage/bluegrass-squirreltail type in "excellent" condition. The condition of all other habitat types excluded from grazing would be expected to be "good" after 15 years following implementation of the proposed action. The impacts of wildlife grazing on these areas would not be anticipated to affect recovery rates.

Facilities to Implement Proposal

Facilities required to implement the proposed action include fences, pipelines, water troughs, livestock trails, reservoirs, wells, and spring developments. Surface disturbance resulting from construction of these facilities would affect approximately 503 acres (TABLE 3-4) and would result in both short-term and long-term impacts on vegetation.

SHORT-TERM IMPACTS (THREE YEARS OR LESS)

Short-term impacts would result from temporary disturbances caused by off-road vehicular travel during the construction and development phases. Vegetation would be expected to recover within two or three growing seasons. Soil compaction resulting from equipment operation would retard growth due to restricted root development and reduced water-holding capacity. Vegetative disturbance during construction would be alleviated through required rehabilitative measures following construction.

Fences and water sources would result in more even distribution of livestock grazing pressure, thereby alleviating some of the pressure on exist-

TABLE 3-4
ACREAGE OF VEGETATION DISTURBED OR DESTROYED THROUGH CONSTRUCTION OF FACILITIES TO IMPLEMENT THE PROPOSAL

Project	Total Units	Acres Disturbed Per Unit During Construction	Total Acres Disturbed	Total Acres Destroyed
Water Projects				
Spring Development	38	.33	12.5	Unknown 1/
Pipelines	14 mi.	1/mile	14.0	.84 2/
Water Troughs	100	.01	1.0	1.0
Reservoirs	65	5.0	325.0	98.0 3/
Wells	13	1.0	13.0	.01 4/
Fences 5/				
Construction	131 mi.	1/mile	131.0	0
Major Renovation	4 mi.	1/mile	4.0	0
Removal	2 mi.	.5/mile	1.0	0
Livestock Trails	4 mi.	.364/mile	1.5	1.5

1/ Depends on method of construction.

2/ .06 acres/mile (6" wide).

3/ 1.5 miles/reservoir either permanently or periodically inundated thereby killing terrestrial vegetation.

4/ Thirteen 4' x 6' cement pads (312 square feet, 43,560 square feet/acre = $\frac{312}{43,560}$ = .01 acre).

5/ Includes exclosure fences.

ing concentration areas. However, the proposed water sources would serve as new concentration areas for livestock. Forage species in the vicinity of the proposed water sources would be heavily utilized during the livestock grazing periods, and trampling effects would be more severe. However, most would be are expected to recover vigor during the rest periods provided in the grazing management systems. Species that would not be provided sufficient rest to recover from very heavy utilization, such as antelope bitterbrush and quaking aspen, would not recover vigor under the proposed action.

LONG-TERM IMPACTS (15 YEARS)

Construction of the following facilities would result in long-term impacts and, in some cases, permanent damage to vegetation at the project sites. Species not provided sufficient rest to recover from very heavy utilization, such as antelope bitterbrush and quaking aspen, would be adversely affected in the vicinities of the proposed water sources.

Wells

Long-term impacts associated with wells would result from the construction of cement pads at the well heads. This would result in a permanent loss of vegetation (TABLE 3-4). Species not provided sufficient rest to recover from very heavy utilization would be adversely affected in the livestock concentration areas resulting from the new water sources.

Spring Developments and Improvements

Vegetative destruction would occur at each project site. However, until development occurs, the actual damage would not be known. Species not provided sufficient rest to recover from very heavy utilization would be adversely affected in the livestock concentration areas resulting from the new water sources.

Pipelines

Methods employed in the construction of pipelines would ensure a minimum of disturbance to vegetation. Ripping of the trench to lay the pipeline could result in long-term disturbance approximately 6 inches wide for the length of the pipelines. However, vegetation would be expected to recover within 15 years.

Water Troughs

Placement of water troughs near wells and along pipelines would result in a permanent loss of vegetation at the site of each trough (about 325 sq. ft. per trough). Species not provided sufficient rest to recover from very heavy utilization would be adversely affected in the livestock concentration areas resulting from the new water sources. Trampling would result in areas denuded of perennial vegetation immediately adjacent to each trough.

Reservoirs

Permanent vegetative loss at each reservoir site would occur due to periodic or permanent inundation which would kill the terrestrial vegetation and would not allow reestablishment of terrestrial vegetation below the water line on the disturbed area. Due to frequent water-level fluctuations, establishment of aquatic vegetation would be expected to be very limited. Species not provided sufficient rest to recover from very heavy utilization would be adversely affected in the livestock concentration areas resulting from the new water sources. Trampling would result in areas denuded of perennial vegetation immediately adjacent to each reservoir.

Fences

New fence construction or major renovation of existing fences would not be expected to result in long-term or permanent loss of vegetation. However, loss of perennial vegetation resulting from trampling might occur on livestock trails developing along portions of the fences.

Livestock Trail Construction

Construction of livestock trails would result in a long-term loss of perennial vegetation in approximately a 12-foot-wide strip along the length of the trail.

Reseeding Tests

The proposed sagebrush eradication and reseeding tests would impact a total of 160 acres in the study area. Woody shrubs would initially be removed from the aboveground vegetation. However, crown-sprouting shrubs, such as rubber rabbitbrush, would resprout and recover from the chaining treatment. Perennial grasses and forbs would not be anticipated to be adversely affected by the chaining operation.

SHORT-TERM IMPACTS (THREE YEARS OR LESS)

The short-term impacts of the chaining and reseeding tests would involve the nearly complete elimination of sagebrush, the resprouting of crown-sprouters, such as rubber rabbitbrush, and increased vigor of native perennial grasses and forbs released from competition with sagebrush. The success of the seedings would be largely dependent upon weather conditions immediately preceding and following the seeding. If soil moisture were sufficient, short-term success of seeded herbs would be expected to be great. However, if drought were to follow the seeding, the area might be subject to cheatgrass invasion. Only one year of rest would be provided for seedling establishment, thus placing especially great dependence upon adequate soil moisture availability for successful establishment in the year immediately following seeding.

LONG-TERM IMPACTS (15 YEARS)

The long-term impacts of the chaining and reseeding tests would involve the successful reestablishment of crown-sprouters, such as rubber rabbitbrush, and increasing abundance of big sagebrush. If the seeded herbs were initially successful, crested wheatgrass could be expected to dominate the herbaceous layer. If the seedings were not successful, cheatgrass would dominate. In either case, four-wing saltbrush would not be expected to survive, because its growth requirements for rest following defoliation (Trlica, et al., 1977) would not be met in a three-pasture rest-rotation grazing system. The visual aspect, after 15 years, would be expected to largely be grass, with scattered shrubs increasing in density.

SOILS

Those properties most subject to drastic change are rate of erosion, sediment yield, percent cover, rate of runoff, and surface soil permeability. Available water-holding capacity of at least the top four inches of soil (Rauzi and Hanson, 1966) is affected because of reduction in surface permeability and alteration of soil bulk density by compression. Soils with very high shrink-swell potential tend to restore their original structure seasonally with alternately wet and dry conditions. Similarly, soils with very low shrink-swell potential and textures of sand, loamy sand, or sandy loam are self-restoring because of their single-grained, easily rearranged structure. Fifty-two percent of the soil series mapped have moderate shrink-swell potential and are subject to more enduring changes in bulk densities when subjected to compaction. However, many of these soils with moderate shrink-swell potential have the compensating property of high frost-heave potential, which tends to restore soils to their normal bulk density in a temperate climate.

Systematic Grazing Management

SOIL EROSION, SEDIMENT YIELD, AND PERCENT COVER

Impacts upon erosion and sediment yield due to implementation of the proposed action are projected on the basis of potential increase, decrease, or no change in vegetation and litter cover. Impacts upon runoff and surface soil permeability are also interrelated with percent cover but have been analyzed separately.

Meeuwig (1970a) found that erosion rates on a soil with bulk density of 1.1 varies from 1.4 tons per acre with a 50-percent ground cover to 0.5 ton per acre with a 78-percent cover, including rock, under simulated rainfall conditions (a convective storm of 5 inches per hour). The indication is that for every 1-percent increase in ground cover between the limits cited above, soil movement downslope can be decreased by 0.03 ton or 60 pounds per acre. Study of the Duckwater, Nevada, watershed by Blackburn (1973) shows that sediment yields under a simulated rainfall rate of 1.5 inches per hour and with varying densities of vegetative cover range from 0.004 to 0.487 ton per acre. Ground cover, including rock, ranged from 45 to 82 percent. A sagebrush community with 42 percent bare ground yielded 0.487 ton per acre of sediment. More study and monitoring are needed to determine sediment yields under more usual and normal conditions of gentle rainfall and runoff and snow melt. At the present rate of downslope movement of sediments shown in TABLE 2-12, changes in productive capacity of soils are estimatable only in increments of 50 to 100 years or more.

Meeuwig (1970a) concluded that protection of the soil surface from direct raindrop impact proved to be the most important means of controlling erosion. The highest correlation was obtained between runoff and proportion of the soil surface protected by plants, litter, and stone. This has been confirmed by others in other climatic zones. Bailey and Copeland (1961) in Utah demonstrated that soil loss during a storm of 2.44

TABLE 3-5

HABITAT TYPE IN RELATION TO PRESENT COVER WITHIN STUDY AREA

Habitat Type Number	Acres	Extent (%)	Present Minimum Cover 100%-(Bareground + Rock)	Now Have 60% Cover (Acres)	Would Attain 60% Cover (Acres)	Might Not Attain 60% Cover (Acres)
HT-4	1,203	<0.5	17			1,293
HT-12	24,737	4.0	26			24,737
HT-2	17,776	3.0	30			17,776
HT-10	959	<0.5	17			959
HT-8	1,126	<0.5	No Data			
HT-21	80,804	12.0	36			80,804
HT-14	12,744	1.0	43		12,744	
HT-1	16,704	3.0	77	16,704		
HT-17	55,594	9.0	41		55,594	
HT-11	2,447	<0.5	22			2,447
HT-6	71,587	11.0	34			71,587
HT-5	12,271	2.0	62	12,271		
HT-20	95,493	15.0	40		95,493	
HT-18	11,709	2.0	45		11,709	
HT-16	2,412	<0.5	28		2,412	
HT-15	13,618	2.0	39		13,618	
HT-24	4,715	1.0	47		4,715	
HT-22	1,225	<0.5	No Data			
HT-7	144,979	22.0	60	144,979		
HT-19	4,336	1.0	69	4,336		
HT-9	1,130	<0.5	44		1,130	
HT-25	5,796	2.0	>80	5,796		
HT-3	1,803	<0.5	34			1,803
HT-23	1,357	<0.5	42			1,357
HT-26	856	<0.5	>80	856		
HT-27			No Data			
HT-13	3,018	<0.5	54			3,018
HT-28	610	<0.5	>80	610		
			TOTALS	185,552	197,415	205,781
			PERCENT	32	33	35

inches per hour with a plant and litter cover of 10 percent was 500 percent greater than that of a site with 60- to 75-percent cover. Packer (1951) found that a 70-percent cover on granitic soils in Idaho was needed for effective control of erosion from high-intensity storms and Marston (1952) determined that a cover of 65 percent or more was required for effective control of overland flow and erosion by rainfall intensities of 3 inches per hour.

Occasional storms of high intensities cited above occur in the Tuledad/Home Camp Study Area, but most of the storms are in the range of 0.7 to 0.18 inch per hour during a two-year period (U.S. Dept. of Commerce, 1972). Many of the habitat types do not have soils with the productive capacity to provide a density of cover that cited studies consider necessary for full soil protection. As a result, vegetative production on those sites might move toward the potential under the proposal but changes in soil losses from the normal rate would be detectable only following high-intensity storms of 2 to 3 inches per hour during the 15-year period. Beyond 15 years, perhaps, no projected reduction in soil loss could be expected at that sustained level of livestock grazing.

Habitat types with minimal potential productive capacity of 250 to 500 pounds of vegetation annually and which might not attain greater than 60 percent cover within 15 years are 2, 3, 4, 10, 11, 12, 13, 16, 23, and 21. Habitat types with slightly higher potential but with marginal productive capacity to effectively control surface erosion and sediment yield are 9, 14, 15, 16, 17, 18, 20 and 24. These have a potential range of 300 to 1,000 pounds of herbage annually and would be expected to attain greater than 60 percent cover within 15 years. Sites that would exhibit the greatest reduction in soil loss following implementation of the proposal are the presently critically eroding but highly productive soils in HT-13 and 27, the deep, fertile deposits adjacent to perennial streams in several areas.

TABLE 3-5 shows the change that would be expected in range condition of specific habitat types. The percent change in species composition, where a change would be predicted, would not be directly proportional to density of ground cover. However, these same habitat types would be expected to increase in density relative to productive capacity of the sites and the ability of the sites to attain a cover that would give adequate protection to the soil. TABLE 3-5 shows those habitat types that:

(1) Now have a vegetative-litter cover of 60 percent of the ground surface.

(2) Could be expected to attain a cover of at least 60 percent.

(3) Might not attain a cover of 60 percent within the lifetime of the project.

Sixty percent is used because it represents a ''threshold'' percentage that is directly related to runoff and soil erosion. Several investigations (Meeuwig and Packer, 1975) consider a vegetative-litter cover of greater than 60 percent adequate to prevent accelerated soil losses due to excessive runoff on soils of arid and semiarid rangelands.

Sixty-five percent of the area within habitat types, exclusive of rockland, rubbleland, and other miscellaneous land types would have, or would be expected to have, adequate cover at the end of the 15-year period. Using the PSIAC (1968) method of estimating sediment yield, the reduction in total soil loss would be about 2.75 tons per acre annually or 1,064,555 tons on these 387,111 acres (see Chapter 2, Soils, for estimates of existing soil sediment yield conditions).

Reduction of soil movement on the remaining 203,889 acres would be consistent with an increase in cover but might perhaps be immeasurable over relatively short periods of time (15 years) and indiscernable from normal geologic erosion under pristine conditions.

Channel aggradation stabilization would result from increased ground cover and reduced overland flow and could be anticipated as a beneficial long-term impact. An analysis by King (1967) of the Conant Creek-Logan Draw complex in Wyoming showed that reduced runoff from low sediment producing watersheds reduced the quantity and velocity of surface flow resulting in a gradual deposition and revegetation of recipient drainage channels. The major drainage where this phenomenon could be anticipated in the study area is Tuledad Canyon. Similar results could be expected in many of the larger drainages of the various hydrologic watersheds shown on MAP 2-6.

Short-term impacts might be more obvious and drastic than the long-term impacts. With concentration of livestock in one pasture, grazing pressure could be considered heavy rather than moderate or light. On pastures grazed immediately prior to winter precipitation and spring runoff, ground cover could not be expected to be equal in density to pastures that would have had no grazing during this time. Consequently, the soil would be subject to accelerated movement in the event of prolonged or high intensity precipitation or rapid snow melt. In these use pastures, reduction in ground cover during the first two to three years could be expected to result in a reduction of litter and an increase in bare soil. Klemmedson (1956) used percent bare soil as one of the criteria in rating ranges as to carrying capacity and watershed condition. Ranges with less than 7.2 percent bare ground were rated "good"; those with 12.8 to 17.2 were rated "fair"; and those with 34.8 to 35.6 percent were rated "poor." Three of the allotments would fall into the "fair" rating and the remainder would be placed in the "fair" to "poor" ratings, using the Klemmedson criteria. It would be highly unlikely that the percent bare ground in any allotment would be increased by 80 to over 100 percent from present conditions. A liberal estimate of the increase in bare ground would be 15 to 20 percent. This would indicate a temporary downward trend in soil protection for the first few years when new seedlings would not yet be established. However, Lusby's (1970) study in Colorado showed that sediment yield can increase by 30 to 90 percent in grazed versus nongrazed pastures. The deeper soils in HT-7, 8, 14, 15, 16, 18, 12, and 24, because of moderate to steep slopes, would be most vulnerable to erosion by higher-than-normal precipitation events in the years that these pastures would be used heavily (see MAPS 1-4, 1-5, and 1-6, sequence of grazing; and MAP 2-1, habitat types).

There are notable exceptions within allotments. Where water is present, either perennially or seasonally, livestock and wildlife congregate in numbers exceeding the productive capacity of the soil. The resulting decimation of vegetative cover and soil compaction prior to fall and winter precipitation leave these sites vulnerable to accelerated velocities of runoff. Because the sites are in easily accessible drainages or are the major conveyance systems for discharge, bare soil, accelerated erosion, and gullying occurred. Habitat Types-13 (wet meadows) and 27 (perennial streams) listed in TABLE 2-1 and on MAP 2-1 are the sites where this condition exists. Similar vegetative and soil losses occur adjacent to stockwater reservoirs and wells in all existing habitat types. The estimated existing sediment yield shown for wet meadows (HT-13) is indicative of the accelerated loss in these areas. Under pristine conditions, soil loss would be about 0.5 ton per acre. Several meadows in the area have been fenced and have shown immediate response (two years) to nearly 100 percent ground cover density. The remaining gullies, two to eight feet deep, would not completely heal within the 15-year period without rehabilitation measures. TABLE 3-6 summarizes the impacts by habitat type or erosion, sediment yield, and percent cover characteristics.

RUNOFF

Rate of runoff is closely allied with soil surface bulk density and permeability. Rauzi and Hanson (1966) demonstrated that bulk density of silty clay and silty clay loam soil was increased by 10 percent on a heavily grazed pasture over that of a lightly grazed pasture. The resulting runoff from the heavily grazed pasture was increased by over 20 percent and the infiltration rate was decreased by 400 percent. Dunford (1949) in a five-year study measured an increase of nearly 30 percent runoff on a heavily grazed pasture over that of a pasture before grazing, and Lusby (1970) measured 30 percent less runoff from an ungrazed pasture. As King (undated) points out, as little as 1 percent of the moisture that enters the soil would support a perennial flow of 5 gallons per minute for surface- or ground-water recharge per square mile of contributing watershed for the entire runoff season. Most of the existing runoff, at least in the closed basins, is now part of the 80 to 90 percent evapotranspiration loss.

SURFACE PERMEABILITY

Studies conducted by Rauzi and Hanson (1966) on finer-textured soils (clay loam and silty clay loam) indicate that water intake can be altered drastically by livestock grazing. On a lightly grazed pasture with 1,800 pounds of total herbage, water intake rate was over twice that of a moderately grazed pasture with 1,300 pounds of total herbage, and for the duration of the precipitation averaged 1.6 times that of the moderately grazed pasture. In the same test, heavy grazing significantly decreased the pore space in the top four inches while soil and surface runoff increased 1.2 percent over that of the lightly grazed watershed.

TABLE 3-6
IMPACTS ON EROSION, SEDIMENT YIELD, AND PERCENT COVER CHARACTERISTICS

Habitat Type	One-Year (Treatment A)	Short-Term (One Grazing Cycle)	Long-Term (15 Years)
1	Moderate (-)	Unknown (x)	Slight (+)
2	Moderate (-)	None (0)	Slight (+)
3	Moderate (-)	Slight (+)	Moderate (+)
4	Moderate (-)	Unknown (x)	Slight (+)
5	Moderate (-)	Slight (+)	Moderate (+)
6	Moderate (-)	Slight (+)	Moderate (+)
7	Moderate (-)	Slight (+)	Moderate (+)
8	Moderate (-)	Unknown (x)	Unknown (x)
9	Moderate (-)	Slight (+)	Moderate (+)
10	Moderate (-)	None (0)	Slight (+)
11	Moderate (-)	Slight (+)	Moderate (+)
12	Moderate (-)	Slight (+)	Moderate (+)
13	Moderate (-)	Moderate (+)	High (+)
14	Moderate (-)	Slight (+)	Moderate (+)
15	Moderate (-)	Slight (+)	Moderate (+)
16	Moderate (-)	Slight (+)	Moderate (+)
17	Moderate (-)	Moderate (+)	High (+)
18	Moderate (-)	Unknown (x)	Slight (+)
19	Moderate (-)	Moderate (+)	High (+)
20	Moderate (-)	Slight (+)	Moderate (+)
21	Moderate (-)	Unknown (x)	Slight (+)
22	Moderate (-)	Unknown (x)	Unknown (x)
23	Moderate (-)	Unknown (x)	Slight (+)
24	Moderate (-)	Slight (+)	Moderate (+)
25	Moderate (-)	Slight (+)	Moderate (+)
26	Moderate (-)	Unknown (x)	Slight (+)
27	Moderate (-)	Slight (+) or Moderate (+)	High (+)
28	Slight (-)	Unknown (x)	Slight (+)

Gifford and Hawkins (1975) concluded the following relationships exist between grazing and soil infiltration rate (f_c):

(1) There is an impact of grazing on infiltration.

(2) There is a distinct impact of heavy grazing. It is statistically different than light/moderate.

(3) There is an apparent beneficial influence of grazing at lower infiltration rates.

(4) Moderate and light grazing may be considered identical, statistically.

(5) As rough, approximate rules, the following might be used for average reactions on more porous soils (Hydrologic Groups A, B, and C):

Moderate/Light Grazing: Reduces f_c to about three-fourths of ungrazed condition.

Heavy Grazing: Reduces f_c to about two-thirds of Moderate/Light, or one-half (=75×.66) of ungrazed condition.

These same research workers concluded that no research studies as yet have shown whether these impacts are short-term or long-term, and whether the impact is abrupt or gradual. It is not known whether the trend is continuous or whether the grazing system has reached a point of equilibrium.

Infiltration rates of soils that have decreased due to heavy grazing can be expected to recover following exclusion of further grazing. The time of recovery required is variable and the recovery is usually slow, according to several research workers. Busby (unpublished data) estimated a four-year period on sandy loam sites in southeastern Utah.

The first-year and short-term impacts upon the surface permeability rate are unknown but would be estimated to be moderately adverse. The surface permeability rates would probably be reduced by one-half (Gifford and Hawkins, 1975) on all of the habitat types of the study area with soils of Hydrologic Groups A, B, and C. Surface permeability rates of some soils of Hydrologic Group D might actually increase slightly during the first one to three years. These are the very slowly permeable clay soils of HT-2, 3, 5, 10, and 23.

Over the long-term, surface permeability probably would be restored to near normal in the soils of HT-1, 4, 6, 7, 8, 9, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 24, 25, 26, 27, and 28. This is due to the beneficial effects of frost action on soil structure and the beneficial effects of rest upon vegetative cover. TABLE 3-7 summarizes the impacts by habitat type on surface permeability and runoff characteristics.

AVAILABLE WATER CAPACITY (AWC)

Available water-holding capacity of a soil can be altered in a manner similar to the alteration of permeability by compaction from grazing animals. Rauzi and Hanson (1966) concluded that the intensity of grazing may alter soil structure to the point that water intake of a heavily grazed site can be 2.5 times less than on a lightly grazed site and 1.8 times less than on a moderately grazed site. Also, the pore space in the top four inches of soil that normally holds infiltrated water was reduced from 10.6 percent total volume under light grazing to 7.7 percent under heavy grazing. The probability that moderately grazed areas have more pore space than heavily grazed areas is about 70 percent. Two-thirds of the area would have impacts associated with heavy grazing pressure; one-third of the area would have the impact of light grazing.

SHRINK-SWELL POTENTIAL

The increased intensity of grazing of individual pastures required by the proposal would have varying effects on soils with shrink-swell or frost-heave potential. Short-term impacts on these sites would be anticipated only seasonally if the soils were compacted when saturated or at field capacity. Compression and temporary destruction of soil structure might inhibit germination of seeds or seedling emergence. The remaining 52 percent of the soils mapped having moderate shrink-swell potential would be subject to increased bulk density and reduced infiltration rates.

Some specific units of soil series and associations are producing vegetation cover at near potential and cannot be materially improved. Inherent soil characteristics and moisture regimes limit species composition and density to nearly a nonproductive and nonprotective status. The Espil-Badland association of the Denio Allotment and HT-21 is an example.

Many highly productive soils are yielding sediments at an accelerated rate because of inadequate vegetative cover caused by intensive grazing use. These sites consist of heavily grazed areas adjacent to perennial streams on wet and semiwet meadows and around livestock water developments.

Additional unmeasured acreages adjacent to roads, migration routes from places of turnout, and trails between watering places support less vigorous and less dense stands of forage-type soil cover in most allotments.

TABLE 3-7
IMPACTS ON SURFACE PERMEABILITY AND RUNOFF CHARACTERISTICS

Habitat Type	One-Year (Treatment A)	Short-Term (One Grazing Cycle)	Long-Term (15 Years)
1	Moderate*(-)	Moderate*(-)	None** (0) or Slight***(-)
2	Slight (+)	Slight (+)	Slight (+)
3	Slight (+)	Slight (+)	Slight (+)
4	Moderate*(-)	Moderate*(-)	None** (0) or Slight***(-)
5	Slight (+)	Slight (+)	Slight (+)
6	Moderate*(-)	Moderate*(-)	None** (0) or Slight***(-)
7	Moderate*(-)	Moderate*(-)	None** (0) or Slight***(-)
8	Moderate*(-)	Moderate*(-)	None** (0) or Slight***(-)
9	Moderate*(-)	Moderate*(-)	None** (0) or Slight***(-)
10	Slight (+)	Slight (+)	None (0) or Slight (+)
11	Moderate*(-)	Moderate*(-)	None** (0) or Slight***(-)
12	Moderate*(-)	Moderate*(-)	None** (0) or Slight***(-)
13	Moderate*(-)	Moderate*(-)	None** (0) or Slight***(-)
14	Moderate*(-)	Moderate*(-)	None** (0) or Slight***(-)
15	Moderate*(-)	Moderate*(-)	None** (0) or Slight***(-)
16	Moderate*(-)	Moderate*(-)	None** (0) or Slight***(-)
17	Moderate*(-)	Moderate*(-)	None** (0) or Slight***(-)
18	Moderate*(-)	Moderate*(-)	None** (0) or Slight***(-)
19	Moderate*(-)	Moderate*(-)	None** (0) or Slight***(-)
20	Moderate*(-)	Moderate*(-)	None** (0) or Slight***(-)
21	Moderate*(-)	Moderate*(-)	None** (0) or Slight***(-)
22	Moderate*(-)	Moderate*(-)	None** (0) or Slight***(-)
23	Slight (+)	Slight (+)	Slight (+)
24	Moderate*(-)	Moderate*(-)	None** (0) or Slight***(-)
25	Moderate*(-)	Moderate*(-)	None** (0) or Slight***(-)
26	Moderate*(-)	Moderate*(-)	None** (0) or Slight***(-)
27	Moderate*(-)	Moderate*(-)	None** (0) or Slight***(-)
28	Moderate*(-)	Moderate*(-)	None** (0) or Slight***(-)

* Surface permeability reduced to approximately one-half (.5) of ungrazed condition.
** Surface permeability restored to approximate rate of ungrazed condition.
*** Surface permeability reduced to approximately three-fourths (.75) of ungrazed condition.

Ephemeral streams, such as Tuledad Creek in the Tuledad Allotment and Cottonwood Creek in the Bare and Denio Allotments, have areas of scour and deposition typical of those in semiarid climatic zones displaying normal geologic erosion. In the absence of past study, it is virtually impossible to determine the portion attributable to acceleration by grazing.

Generally, watershed condition is fair to good. Specific areas of heavy concentrations of animal use have not deteriorated to the extent that they could not recover to near potential.

Custodial Management

Impacts on custodial lands are undetermined since no projections have been made as to vegetative changes.

Grazing Exclusions

The long-term impacts upon erosion, sediment yield, cover, surface permeability, and runoff would be high (+) in HT-13 and 27. Short-term impacts upon these habitat types would be slight (+) or moderate (+).

The impact on badlands and rubbleland would be either slight (+) or none (0). Large acreages of these miscellaneous land types occur in the Bicondoa and Lower Lake Allotments. Exclusion from grazing would have no impact upon playa, a miscellaneous land type of large extent in the Lower Lake Allotment.

Habitat Types 4, 10, and 11 are excluded from grazing in the Bicondoa Allotment. The long-term impact upon erosion, sediment yield, cover surface permeability, and runoff in these types would be none (0) or slight (+). These soils might not attain a cover of greater than 60 percent and the degree of response would be low even after 15 years. The long-term impact upon erosion, sediment yield, cover, surface permeability, and runoff in HT-11 would be slight (+) or moderate (+) due to the moderate increase in cover, elimination of trampling, and restoration of soil structure.

Facilities to Implement the Proposal

Installation of some structures necessary to implement the proposal would have long-term impacts on a relatively small percentage of the soil sites.

Adverse effects of fence construction would be temporary and immeasurable since trails would not be cleared mechanically for construction.

Approximately 223 acres of soil would be permanently nonproductive because of the physical presence of management facilities.

Disturbance of soil during construction of the above facilities would impact approximately 700 acres. The impact would be relatively short term.

Approximately 1,200 acres of soil would be permanently nonproductive around watering sources and in constructed livestock trails because of trampling, bedding, and forage use by animals.

Reseeding Tests

Minor adverse impacts from vegetation and soil disturbance would occur during test plot installation. Soil erosion would be greater than present rates of erosion for one to three years, depending upon seedling establishment. After seedling establishment, root development, and plant growth, erosion would be reduced below current rates.

WATER

Systematic Grazing Management

Under the proposed systematic grazing management system, during any one year, one pasture would be rested from grazing use season-long (Treatment C). During that same year, under the three-pasture system, the stocking rate would be increased in both use pastures (Treatments A and B), but for a shorter period in the "seed-ripe" pasture (Treatment B). Under the two-pasture system, the stocking rate would be increased in the use pasture (Treatment A); grazing would be eliminated entirely from the rest pasture. Thus, with respect to water resources, livestock grazing use, and therefore subsequent impacts, would be heavy in the pastures receiving Treatments A and B, or non-existent in the Treatment C pasture, during any one year.

SURFACE RUNOFF

Surface runoff is the result of precipitation (quantity and intensity), topography, soil permeability, vegetation (quantity and variety), and, sometimes, temperature.

Rainfall causes compaction when its striking force is absorbed by bare soil; a cover of vegetation and litter effectively neutralizes this force. Increased vegetative cover retards the rate at which water moves onto or across the soil and increases evapotranspiration losses. Branson, et al. (1972) indicate that infiltration can be increased by as much as 127 percent where fibrous-rooted vegetative species are present. According to King (1971), ". . . initiation of a rest-rotation grazing system could reduce runoff by half."

Bailey and Copeland (1961) found that runoff during a 2.44-inch rainfall was reduced from 14 percent in an area with 37 percent ground cover to 2 percent in a pasture with 60-75 percent ground cover. As indicated in the Soils section, Chapter 3, 65 percent of the study area now has, or would be expected to attain during the life of the proposal, adequate cover (60 percent) (see TABLE 3-5). The remaining 35 percent would not attain 60-75 percent cover density because of low fertility, salinity, or soil structural problems (TABLE 3-5).

During the first year of implementation of the proposed systematic grazing system, the pasture most vulnerable to increased surface runoff would be Pasture 1 receiving Treatment A. Grazing here would be at a higher intensity for a shorter duration; vegetation would be utilized heavily all season long. Bare ground could be increased by 15 percent causing an increase in surface runoff. However, this pasture would experience an increase in fibrous-rooted species (grasses) by 4 percent and total cover by 2 percent (TABLE 3-8, Example 1); infiltration will also increase. Cumulatively, this change would reduce the impact of grazing with respect to surface run-off.

Pasture 2, receiving Treatment B (no grazing until seedripe), would have bare ground reduced by 5 percent and an increase in fibrous-rooted species by 5 percent (TABLE 3-8, Example 2). Pasture 3, which would be rested season-long, would have a 2-percent decrease in bare ground and a 6 percent increase in fibrous-rooted species (TABLE 3-8, Example 3). Thus, during the first year of implementation of the proposal, bare ground will be decreased, with a concomitant decrease in surface runoff, in all pastures. Livestock grazing will have a diminishing impact on vegetation and soils.

The second through fifth years of implementation would be expected to approach conditions similar to TABLE 3-8, Example 4. Bare ground might be reduced 5 percent, causing surface runoff to be reduced. After the fifth year, each Treatment A will occur in a pasture that has received two years of rest.

In the long term, site potential indicates that ground cover could be complete enough in the high precipitation areas to reduce surface runoff appreciably, effectively stopping surface runoff from approximately 75 percent of the study area. Shallow reservoirs dependent on surface runoff to refill would cease to have water eventually. Increased spring flow would compensate for this loss.

The two-pasture grazing system treatments are alternated each year, allowing each pasture one full year of rest prior to grazing. Assuming that surface runoff and grazing intensity have a straight-line relationship, as suggested by Lusby (1970), it would be possible to increase the bare ground by 10 percent in either pasture of the Selic-Alaska Allotment (TABLE 3-8, Example 1, Pasture 1, Treatment A). The first-year impact would be significant. The ungrazed pasture (Treatment C) would have surface runoff greatly reduced. Total cover could be increased 4 percent. A comparison to Pasture 3, first year (TABLE 3-8, Example 3) is relevant although the latter could expect 30 percent use in the rest pasture (TABLE 3-8, footnote 1).

The two-pasture grazing system would be fully implemented by the second year because Treatment A (season-long grazing) would be in a pasture which would have had one full year of rest. Surface runoff in the second year would be expected to be reduced because bare ground would decrease by 8 percent (TABLE 3-8, Example 4). If vegetative changes were to occur as predicted, the impact from grazing would diminish as vegetation moved toward site potential.

INTERFLOWS

This water, within reach of the vegetative root zones, is absorbed by the soils from precipitation (snowbelt or rain) and is subject to evapotranspiration from both fibrous and taprooted plants. After evapotranspiration the remaining interflow provides water to streams, springs, seeps, and subirrigated mountain meadows.

Fibrous-rooted plants do not compete with the taprooted plants for deeper interflowing water. The fibrous-rooted plants draw water from shallower areas during the growing season then become dormant. Taprooted plants withdraw moisture from 6 feet or more all year. They also increase their consumption rate as more water becomes available (Blackburn and Skau, 1974).

Increases in interflow waters which feed streams, springs, seeps, and mountain meadows would be expected after 15 years. Moisture loss

TABLE 3-8
AVERAGE PERCENTAGE CHANGE (TREND) IN COVER - THREE-PASTURE SYSTEM

	Year 1	Year 2	Year 3
		TREATMENTS	

EXAMPLE 1

Pasture 1	A	B	C[2/]
Bare Ground	+10	10	0
Litter	- 4	+10	+ 5
Fibrous root (Grass)	+ 4	+ 3	+ 1
Taprooted (Sagebrush)	- 2	+ 2	+ 1
TOTAL COVER	+ 2	+ 2	+ 3

EXAMPLE 2

Pasture 2	B	C[2/]	A
Bare Ground	- 5	- 5	
Litter	+ 1	0	
Fibrous root (Grass)	+ 5	+ 9	
Taprooted (Sagebrush)	-10	+10	
TOTAL COVER	+ 2	+ 4	

EXAMPLE 3

Pasture 3	C[1/]	A	B
Bare Ground	- 2	Unavailable	Unavailable
Litter	-10		
Fibrous root (Grass)	+ 6		
Taprooted (Sagebrush)	0		
TOTAL COVER	+ 4		

EXAMPLE 4

		FIRST THREE-YEAR AVERAGES	
Pasture	1	2	3
Bare Ground	- 5	- 8	-10
Litter	+10	+10	N/A [2/]
Fibrous root (Grass)	+15	+12	+17
Taprooted (Sagebrush)	+ 4	+ 1	+ 5
TOTAL COVER	+ 3	+ 4	unavailable

1/ Grazed 30 percent by trespass livestock.
2/ Grazed trespass resulted in 24-46 percent utilization.
Source: Eckert, 1976.

from evaporation would be expected to be reduced as herbaceous species increase. Soil moisture storage under grass cover is greater than by grass (Corbett and Crouse, 1968). Interception losses may account for as much as 10 to 40 percent of the annual precipitation (Craft and Hoover, 1951).

The water from interflow systems is critical to the reestablishment of meadows. This is accomplished by washes being closed from the sides and the increased moisture drowning invading shrubs and providing ideal moisture conditions for riparian vegetation to reestablish.

King (1971) indicates that lack of perennial flow on most lands administered by the BLM results from no percolation of water through the soil. His interviews with ''oldtimers'' indicated that many presently ephemeral streams were perennial ones before initiation of ranching in the West. He attributes this change in the hydrologic regime to a change in plant cover from grasses to shrubs, which has ''. . . significantly reduced soil-moisture storage and consequent ground-water recharge . . .'' He concludes that a change from shrubland to grassland will increase ground-water recharge and thus increase perennial streams.

This same relationship would be expected to occur within the study area.

WATER QUALITY

An equilibrium now exists between existing water quality and uses. Water quality would be expected to improve with changes in the quantity of interflowing water. Livestock grazing use as proposed would change the quantity of water by stimulating increase of grasses and by decreasing sagebrush, thus reducing evapotranspiration from interflow, allowing more to resurface in seeps, springs, and streams.

Custodial Management

No change from the present situation or adverse impacts would be expected with respect to surface runoff, interflow, consumptive use, and water quality.

Grazing Exclusions

The exclusion of 8,075 acres of meadow or riparian areas from livestock grazing would have an unquantifiable but significant local effect on the hydrologic regime. Small quantities of surface runoff would be completely stopped. Interflow water conditions would increase in the meadow areas. The fenced areas would still be dependent on the precipitation-vegetation relationships in the higher, larger grazed watershed areas.

The Bicondoa Allotment, 10,845 acres, is not grazed now nor is grazing proposed; the impacts of this action, although slightly beneficial over the short term, would result in moderate beneficial impacts to the hydrologic regime over the long term. Similar impacts, as described for grazing exclusions, would occur, although HT-4, dominant on the Bicondoa Allotment, would show a slight to moderate improvement due to the physical characteristics of the soil. Decreased runoff and increased infiltration would occur as vegetation cover increased, but not to the degree expected on deeper, more developed soils.

Facilities to Implement the Proposal

The construction of these facilities (fences, reservoirs, springs, etc.) would cause only short-term impacts affecting the existing watershed hydrology. The isolated location and nature of the facilities would have a very minor impact on watershed hydrology. Added evaporation loss from 133 new water sources would be estimated at 160 acre-feet annually.

Reseeding Tests

Surface runoff would only be slightly affected. Infiltration rates would not be significantly different and interflows of water would not change. No increase in these parameters would be expected (Gifford, 1975).

ANIMALS

Terrestrial Animals

SYSTEMATIC GRAZING

Short-Term Impacts

The short-term impacts of the proposed systematic livestock grazing would vary according to the treatments involved and the cumulative results of the system at the end of one cycle.

Mule Deer

In the ''A'' treatment, roughly one-third of the study area (one-half in the two-pasture system) would be grazed season long by livestock at a higher stocking rate than in the past. Livestock would utilize most of the grasses and forbs during April and May in the three-pasture systems and after July in the two-pasture system, causing forage to be scarce for deer. This would be particularly acute in the meadow and riparian habitats (HT-13 and 27). Deer use these habitat types because they produce much more vegetation per unit area than dry sites and plants here have nearly double the protein content (Patton and Judd, 1970). Although only 4,211 acres of HT-13 and 27 occur in the study area, 1,163 acres of these types will be grazed during the first year under Treatment A. Deer would have less forage and would have to range farther or would have to adjust behavior patterns and move to ungrazed pastures. Either action would require an energy drain at a time when pregnant does must maintain a high plane of nutrition to produce healthy young. Unhealthy fawns are more vulnerable to predation and other decimating factors and their loss lowers recruitment and ultimately results in population decreases. In the two-pasture system, Treatment A would begin after July 1 and competition for spring and early summer forage would not occur, thus fawn production would be more successful on the area grazed under this treatment.

Competition is intense between livestock and deer for bitterbrush and curlleaf mountain mahogany in the study area (Berg, 1966; Tueller and Monroe, 1974). According to Berg, livestock consumed all bitterbrush and mountain mahogany available after all grass had been eaten in the Fox Mountain area of the Bare Allotment. Where grass and browse forage is available, livestock usually prefer grass until mid-summer when protein content of grass decreases while browse protein content remains high. At this time, livestock may make heavy use of bitterbrush and mountain mahogany. Late fall livestock grazing generally decreases the amount of bitterbrush and mountain mahogany available for wintering deer.

Salwasser (1975) correlates poor winter fawn survival with poor bitterbrush availability (short leader length). Heavy livestock utilization of browse plants on deer intermediate and winter ranges could cause starvation of adult animals during severe winters.

In the Treatment B pastures, one-third of the study area would be grazed from about the first of August or mid-August to the end of October. Livestock use of early spring and summer deer forage would not occur but grazing of bitterbrush and mountain mahogany ranges in this treatment would cause the same impacts as those for Treatment A.

In the Treatment C pastures, roughly one-third of the study area would be completely rested from domestic livestock grazing. All forage production would be available to wildlife and wild horses. Competition for forage would not exist between livestock and deer, so deer would be limited only by habitat production.

Approximately 70 percent of the deer habitat under Treatments B and C would be free of livestock competition for grasses and forbs during the spring and early summer. However, about 30 percent of the deer habitat under Treatment A would receive heavy livestock use, creating strong competition with deer for spring and early summer forage. Approximately 70 percent of the deer habitat under Treatment B would receive heavy summer and fall livestock use of bitterbrush and mountain mahogany, leaving little available for deer summer, fall, and winter use. About 30 percent of the deer habitat under Treatment C would receive no livestock grazing, thereby eliminating competition between livestock and deer. Percentages would vary from year to year because deer habitat is not evenly distributed within the allotments or pastures. Additionally, there is the potential that the system would have to be broken during the first year of implementation and Treatment Areas B and C would be used by livestock more than planned, thus increasing competition.

The net impact after the first cycle of the grazing systems would be expected to be a net loss of animals.

A 5- to 10-percent reduction in deer population would be anticipated. Drought or severe winter weather would push expected losses toward the upper end of the range, while a mild winter, abundant spring and fall moisture and adaptability of deer to changing their use patterns would push expected losses toward the minimum estimate. The major areas of the impacts would be expected in the Tuledad, Bare, and Home Camp Allotments, which contain the largest percentage of deer habitat in the study area. The impact on deer would be severe when livestock use the Cottonwood Pasture of the Tuledad Allotment where concentrated deer winter use occurs. Livestock use on the Hays Canyon Pasture in the Home Camp Allotment and the Clover Creek Pasture of the Bare Allotment would be detrimental to particular summering deer herds because the majority of the range occurs in one pasture.

PRONGHORN ANTELOPE

In the Treatment A areas, one-third of the study area would be grazed by livestock at a higher rate than in the past. Livestock in the "A" treatment pastures would consume most grasses and forbs, leaving little for antelope. Antelope would have to range farther for the same amount of food or would have to move to ungrazed pastures, where their behavior patterns would have to be adjusted to their new surroundings. Either action would require an energy drain on the animals at a time when does carrying kids must maintain a high level of nutrition if they are to produce healthy young. Unhealthy kids are more vulnerable to predation and other decimating factors and their loss lowers recruitment to the herd and ultimately decreases the antelope population. Heavy livestock use will also occur on bitterbrush during Treatment A. Antelope make heavy summer and fall use of these plants but their degree of dependence on it is not known. The response of antelope to the lack of bitterbrush cannot be identified.

Impacts on antelope would be greatest on the yearlong habitat in the Coppersmith and Cottonwood pastures of the Tuledad Allotment and in the Duck Flat, Hoover Ranch, Old Camp, and Fox Mountain pastures of the Bare Allotment.

In the "B" treatment areas, early spring and summer competition between livestock and antelope would not occur so does and kids would maintain a high level of nutrition during that period. Livestock would make heavy use of bitterbrush during the late summer and early fall. Again, the impacts of this cannot be clearly analyzed because of the lack of information on the dependence of antelope on bitterbrush.

In the Treatment C pastures, antelope would be free from competition with livestock and would have no shortage of spring grasses and forbs and summer and fall bitterbrush. Limiting factors related to food would not affect the antelope population; kid production and survival would be more successful.

Approximately 70 percent of the antelope habitat (pastures receiving Treatments B and C) would be free of livestock competition for grasses and forbs during the spring and early summer. However, about 30 percent of the habitat (Treatment A areas) would receive extremely heavy livestock use creating a strong competition with antelope for spring and early summer forage. About 70 percent of the habitat (Treatment Areas B and C) would receive heavy summer and fall livestock use on bitterbrush, leaving little available for antelope summer use. About 30 percent of the antelope habitat (Treatment C areas) would receive no livestock grazing, thereby eliminating competition between livestock and antelope. These percentages would vary from year to year because antelope habitat is not evenly distributed within allotments or pastures. There is also the potential that the grazing system would have to be broken during the first year of implementation and Treatment Areas B and C would be used by livestock more than planned, thus increasing the competition mentioned above.

The net impact at the end of the first cycle of the grazing system would be expected to be no change in antelope populations until forage responds to management.

SAGE GROUSE

Treatment A would occur on approximately one-third of the sage grouse habitat which includes nesting complexes and critical meadow habitat. Effects of this treatment would include some nest loss or abandonment caused by livestock trampling, livestock use of succulent forbs (in HT-13 and 27) required by sage grouse chicks during development, and removal of vegetative cover by livestock. The A treatment in the two-pasture system would not have the adverse impacts of nest loss or abandonment but competition for succulent forbs and removal of protective cover would still occur to a lesser degree. Residual litter for nesting cover would also be lacking.

Treatment B would occur on approximately one-third of the sage grouse habitat, which includes nesting complexes and critical meadows habitat. Effects of this treatment would include no nest disturbance from livestock, little residual nesting cover, increased forage on brood meadows (HT-13 and 27), and increased current annual growth of vegetation for cover. By approximately the first of August, when livestock are turned into the Treatment B pasture, all sage grouse chicks would have been hatched for 8 to 10 weeks. By the time livestock make substantial use of the Treatment B pastures, young sage grouse would have progressively increased their intake of sagebrush, if the study area birds' habits are similar to sage grouse chicks studied by

Klebenow and Gray (1968). The late summer and fall removal of vegetation by livestock would decrease protective cover for birds during fall and winter.

Treatment C would occur on approximately one-third of the sage grouse habitat, which includes nesting complexes and meadow habitat. Effects of this treatment would be the same as under Treatment B except that no forage would be removed by livestock, even in the fall. A graphic illustration of short-term impacts on sage grouse is shown in FIGURE 3-2.

The impacts of all three treatments would be a population decrease on between 30 and 38 percent of the area each year and an increase in the sage grouse population on about 70 percent of the area; adverse impacts would be less in the two-pasture system. There would be a net result of a larger sage grouse population on the study area, notwithstanding the effects of other limiting factors. Potential increases would be reduced by breaking the system to go into other pastures early.

QUAIL

In the short term, quail would be affected generally the same as sage grouse, with adverse impacts occurring during Treatments B and C. The net short-term impacts would be a slight increase in quail populations.

WATERFOWL

In comparing the three grazing treatments, Treatment C allows good nesting cover to accumulate while the other two treatments provide poor nesting cover. FIGURE 3-3 schematically traces impacts of the three treatments. Because livestock normally concentrate heavily on areas of waterfowl nesting habitat and keep vegetation closely hedged, increased livestock concentrations would have the same effects on cover vegetation as continuous grazing at lower stocking rates. Waterfowl habitat in Treatment A areas, after the first year of the system, would contain an increase in residual cover over current nesting season conditions on the study area. As soon as livestock are released onto the range, in April during intense nesting activities, livestock would begin forage removal and nest disturbance in the riparian areas and upland areas near water. In the Treatment B pastures containing waterfowl habitat, residual nesting cover would be absent due to the previous year's livestock use but livestock disturbance or destruction of nests would not occur. Waterfowl nesting in Treatment C areas would not be afforded the protection of residual vegetation for nesting cover but no nest destruction or disturbance due to livestock would be expected.

Although literature treating waterfowl production and rest-rotation grazing indicates short-term increases in waterfowl production, analysis of the proposed action on the subject area intimates the opposite. Until more specific responses can be monitored, the impacts must be considered unknown.

NONGAME SPECIES

In Treatment A, the concentrated grazing of the proposed action would alter vegetation relative to reduced food and cover, in addition to adversely affecting the productivity of ground nesting birds and surface nesting rodents through exposing or trampling of nests. Food and cover reductions would decrease reproduction and adult animal survival, which would add fewer individuals to the populations.

In Treatment B, livestock grazing would not occur during the reproductive season and adequate food and cover would be available and reproduction and survival would be greater in these areas. In Treatment B, grazing would be resumed on these pastures in mid-summer and food and cover of many of these species would be removed and adult animal survival might be reduced, except in the case of predators that would benefit from the increased vulnerability of prey.

In the C treatment areas, vegetation would be permitted to regenerate and greater amounts of forage and cover would be available. This may make possible an increase in reproductive success and survival of many species.

The cumulative results of the systematic grazing systems on nongame species populations are expected to vary from none to slightly negative. The slight decrease in populations would be caused by the likely necessity to break the systems and graze pastures earlier than scheduled or pastures scheduled for rest.

THREATENED OR ENDANGERED SPECIES

The bald eagle and peregrine falcon would not be expected to be significantly impacted by the proposed systematic grazing.

FIGURE 3-2
SHORT-TERM IMPACTS - SAGE GROUSE

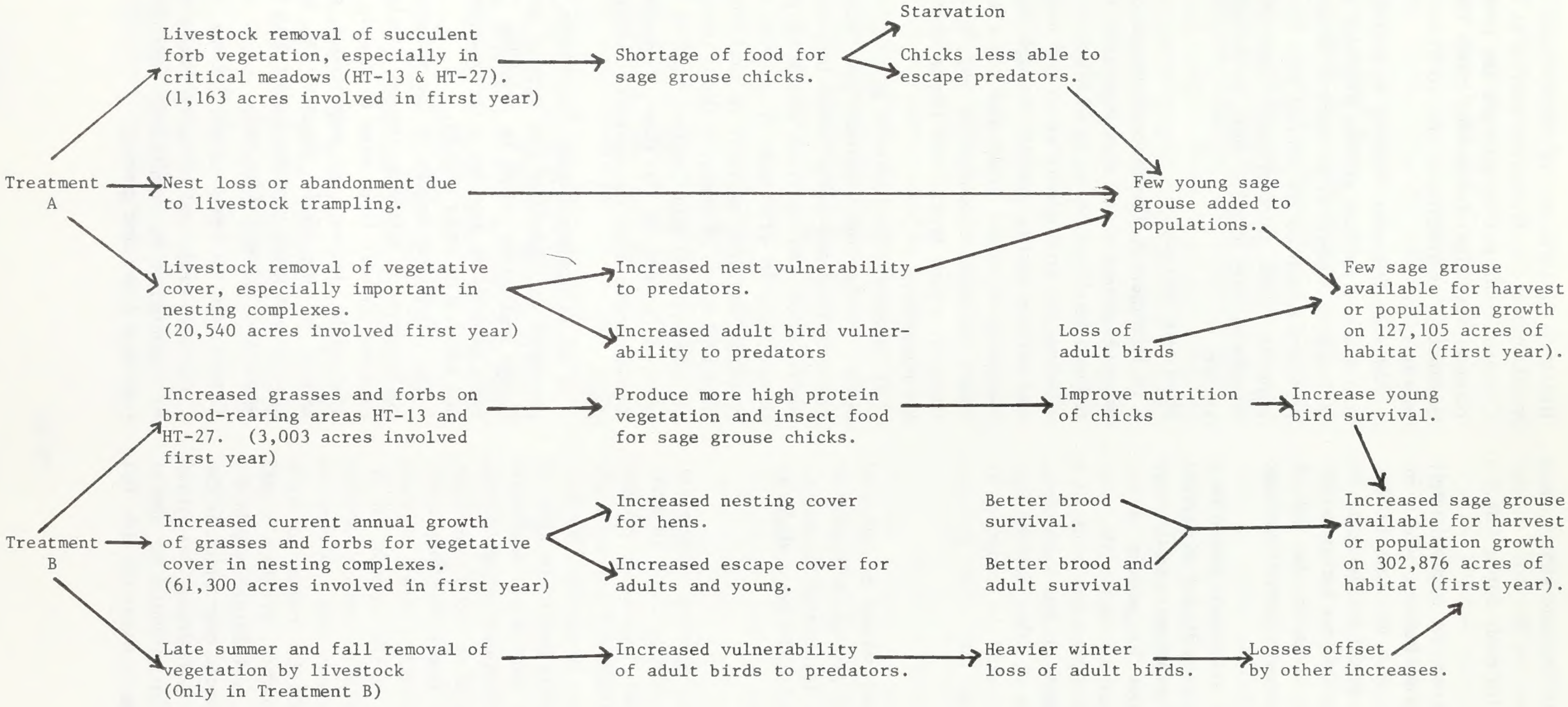
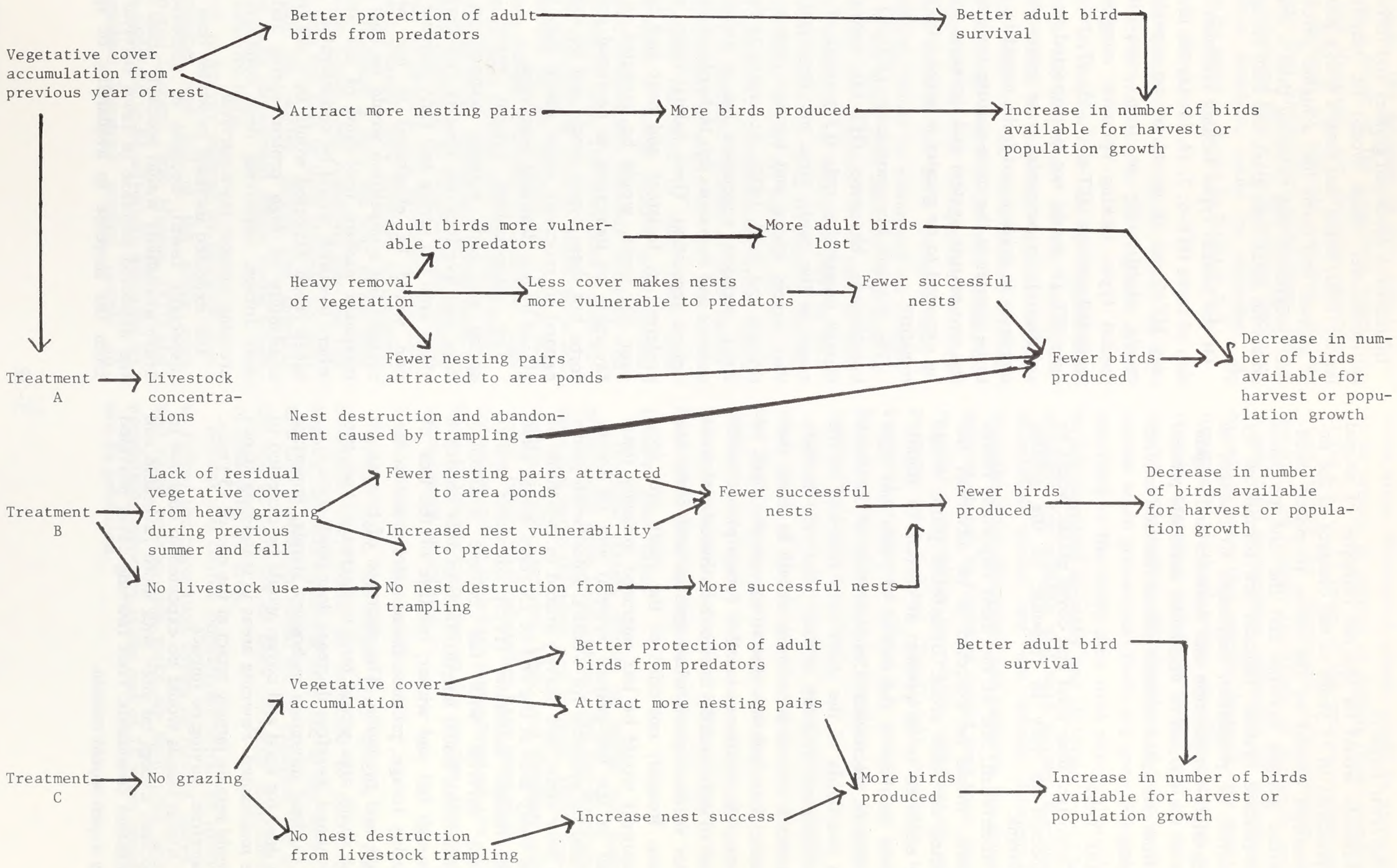

Treatment A
Livestock removal of succulent forb vegetation, especially in critical meadows (HT-13 & HT-27). (1,163 acres involved in first year)
Shortage of food for sage grouse chicks.
Starvation
Chicks less able to escape predators.
Nest loss or abandonment due to livestock trampling.
Few young sage grouse added to populations.
Livestock removal of vegetative cover, especially important in nesting complexes. (20,540 acres involved first year)
Increased nest vulnerability to predators.
Increased adult bird vulnerability to predators
Loss of adult birds
Few sage grouse available for harvest or population growth on 127,105 acres of habitat (first year).
Treatment B
Increased grasses and forbs on brood-rearing areas HT-13 and HT-27. (3,003 acres involved first year)
Produce more high protein vegetation and insect food for sage grouse chicks.
Improve nutrition of chicks
Increase young bird survival.
Increased current annual growth of grasses and forbs for vegetative cover in nesting complexes. (61,300 acres involved in first year)
Increased nesting cover for hens.
Increased escape cover for adults and young.
Better brood survival.
Better brood and adult survival
Increased sage grouse available for harvest or population growth on 302,876 acres of habitat (first year).
Late summer and fall removal of vegetation by livestock (Only in Treatment B)
Increased vulnerability of adult birds to predators.
Heavier winter loss of adult birds.
Losses offset by other increases.

FIGURE 3-3
Short-Term Impacts--Waterfowl


Vegetative cover accumulation from previous year of rest
Better protection of adult birds from predators
Better adult bird survival
Attract more nesting pairs
More birds produced
Increase in number of birds available for harvest or population growth
Treatment A
Livestock concentrations
Adult birds more vulnerable to predators
More adult birds lost
Heavy removal of vegetation
Less cover makes nests more vulnerable to predators
Fewer successful nests
Fewer nesting pairs attracted to area ponds
Fewer birds produced
Decrease in number of birds available for harvest or population growth
Nest destruction and abandonment caused by trampling
Treatment B
Lack of residual vegetative cover from heavy grazing during previous summer and fall
Fewer nesting pairs attracted to area ponds
Increased nest vulnerability to predators
Fewer successful nests
Fewer birds produced
Decrease in number of birds available for harvest or population growth
No livestock use
No nest destruction from trampling
More successful nests
Treatment C
No grazing
Vegetative cover accumulation
Better protection of adult birds from predators
Attract more nesting pairs
Better adult bird survival
More birds produced
Increase in number of birds available for harvest or population growth
No nest destruction from livestock trampling
Increase nest success

Long-Term Impacts

Impacts would be the net response of animal populations in 15 years to the changes in the environment caused by the seven proposed three-pasture grazing systems and the one proposed two-pasture system. Impacts are formulated by analysis of population responses to changes in vegetation composition and densities and responses to the amount of vegetative materials present in time and space to meet animal function requirements.

MULE DEER

Important deer food and cover plants would be expected to vary in response to the grazing systems.

Bitterbrush, one of the most important forage plants, would be expected to be adversely impacted on some areas. Bitterbrush plants would be expected to be present at current or slightly fewer numbers at the end of 15 years and vigor would be decreased. Concentration of livestock on two-thirds of the study area (one-half in the two-pasture system) would tend to increase livestock use on bitterbrush except in areas that restrict livestock use due to topography, lack of water, etc. Increases in other forage plants would tend to defer use by livestock on bitterbrush until later in the season when grasses and forbs are gone. Roughly one-third of the study area (rest pastures) would be left ungrazed annually (one-half in the two-pasture system) and all forage would be available for wildlife. Bitterbrush plants in poor vigor, and heavily grazed in two-thirds of the study area at the end of 15 years would yield less forage. Salwasser (1975) correlates winter fawn survival with fall browse availability (bitterbrush leader length). Does in poor condition through fall and winter, because of the lack of quality forage, produce fawns more prone to disease and predation. The decrease of browse on the study area would tend to decrease fawn survival and therefore decrease deer production.

Curlleaf mountain mahogany stands, important to deer for food and cover, would be expected to be maintained. Fawning areas in mahogany stands would remain largely intact at the end of 15 years, therefore, having no impact.

Aspen stands would be expected to continue to decline, except on sites with more favorable soil moisture conditions. Poor fawning cover provided by aspen would remain.

Increases in perennial grasses and forbs on deer spring-summer range would be beneficial. Julander (1962) noted that ranges with a good supply of grasses and forbs had a higher percentage of deer pregnancy and twinning than a comparable area with much less grass and forb forage available.

Of the habitat types lacking optimum composition of forbs (HT-6, 7, 14, 15, 16, 18, 19, and 20), only HT-6 and 18 would not be expected to increase significantly in forb composition. Of habitat types lacking optimum composition of perennial grasses (HT-6, 7, 15, 17, 18, and 24), only HT-18 would not be expected to increase significantly in perennial grass composition. The increases in grasses and forbs would be expected to be greater in the three-pasture systems than in the two-pasture system and increases would also be expected to be greater in areas with more soil moisture.

The Nevada bluegrass-sedge (HT-27) and willow/Nevada bluegrass (HT-13) habitat types, though comprising only 0.5 percent of the deer range in the study area, are important because they supply spring and summer protein for deer (Patton and Judd, 1970). According to Patton and Judd, meadow vegetation has a higher protein content and maintains this higher level longer than upland vegetation. These habitat types, which are preferred by livestock and have had no rest in over 100 years, would be expected to respond favorably by increasing in perennial grasses and forbs but these types would not be expected to expand to reoccupy areas where they were displaced by less desirable vegetation.

The three-pasture system would eliminate spring and early summer competition between deer and livestock on roughly two-thirds of the study area (all spring and early summer competition would be eliminated in the two-pasture system) but competition would be high in the A treatment pasture (one-third of the study area) where livestock would be concentrated. The combined result expected would be a net increase in availability of high protein spring and summer deer forage, improving deer condition and increasing summer fawn survival.

The expected increase in winter deer mortality (especially fawn), because of decreased bitterbrush availability would probably equal or exceed the expected increase in fawn survival resulting from the increase in availability of spring and summer forage. The decrease in deer populations expected as a result of the long-term vegetative changes and livestock use patterns mentioned above are difficult to estimate because of the many factors that control deer populations. However, it is estimated that a 10-20 percent decrease from current numbers could be expected. A breakdown by areas is shown in TABLE 3-9.

PRONGHORN ANTELOPE

Important antelope food plants would be expected to vary in response to the proposed systematic grazing.

Increases in density and variety of perennial forbs, which are important in the antelope's spring diet, would be expected in most habitat types as a result of the three-pasture grazing system; no antelope occur in the area designated for a two-pasture system. Competition between livestock and antelope for early spring forage, a current problem, would be eliminated on roughly two-thirds of the study area annually. The area of antelope habitat left ungrazed from year to year would vary, depending on which pastures in each allotment were under the same treatments. On ungrazed areas relief would be realized on HT-13, 23, and 27, livestock concentration areas which are important to antelope because of plant succulence and availability of water.

Approximately one-third of the study area under Treatment A would receive concentrated livestock use; competition between antelope and livestock would be high. The combined results expected from the grazing system would be a net annual increase in the amount of spring and summer forb forage available to antelope. This might result in does coming onto increased succulent green forage in the spring and giving birth to kids in better condition to withstand decimating factors such as disease and predation. As kids grow and are weaned, they continue to maintain good body condition if they are able to eat high protein forage. Good body condition into the fall and winter aids the kids in their struggle for survival through the winter. Better kid survival would mean more recruitment which would result in a larger antelope herd.

Bitterbrush is heavily utilized by antelope during the summer and fall in the study area (Tsukamoto and Diebert, 1968; Hanley, 1977) and it would be expected to be adversely impacted by the three-pasture livestock grazing system on some areas. Bitterbrush plants would be expected to be present at current or slightly fewer numbers at the end of 15 years of the grazing system and vigor would be decreased. Concentration of livestock on roughly two-thirds of the study area would tend to increase utilization of bitterbrush except in areas that restrict livestock use due to topography, lack of water, etc. The expected increases in grasses and forbs would tend to defer use by livestock on bitterbrush until later in the season when grasses and forbs are gone. Roughly one-third of the study area (rest pastures) would be left ungrazed annually and all forage would be available for wildlife and wild horses. Because bitterbrush plants are not evenly distributed throughout the allotments and pastures, the actual amount grazed by livestock would vary from year to year, depending on which combination of pastures were utilized. Total yield, however, is expected to decrease. Since it is unclear just how important bitterbrush is to antelope the impacts cannot be clearly identified.

The increases in antelope populations possible as a result of the long-term vegetative changes and livestock use patterns mentioned above are difficult to estimate. However, a 50- to 100-percent increase over the current 1,200 animals in the Systematic Grazing Areas would be possible.

RABBITS AND HARES

Livestock grazing effects on rabbit and hare populations have been studied, but the literature does not agree (Flinders and Hansen, 1975; Sanderson, 1959; Tiemeier, 1968; and Stoddart and Smith, 1955). No local studies have been made to determine rabbit and hare populations or the effects of livestock grazing on the species, thus impacts cannot be defined.

LARGE MAMMAL PREDATORS

Though deer, the major prey species of the mountain lion, would be expected to decrease slightly, an accompanying decrease in the mountain lion population would not be expected due to the sparse densities of lions currently suspected of inhabiting the area.

Bobcat and coyote populations would be likely to follow the population cycles of rabbits, hares, and small rodents that make up their prey and population responses at the end of 15 years could not be predicted.

TABLE 3-9

MULE DEER POULATION NUMBERS EXPECTED ON SYSTEMATIC GRAZING AREAS 15 YEARS AFTER IMPLEMENTATION OF THE PROPOSED ACTION IN COMPARISON TO CURRENT NUMBERS

Season of Use	Deer Herd Management Unit					
	012	013	014	015	Calif.	Total
Yearlong						
Current	68	360	126	458		1012
Expected	54-61	288-324	101-113	366-412		809-910
12/1 - 4/31						
Current				1360		1360
Expected				1088-1224		1088-1224
Apr.-Oct.						
Current					3000	3000
Expected					2400-2700	2400-2700
Nov.-Dec.						
Current					1000	1000
Expected					800-990	800-990

SAGE GROUSE

Generally, sage grouse would be favorably impacted by the long-term vegetative changes. Changes that would affect sage grouse are increased plant vigor, increased vegetative density, increased composition of grasses and forbs, maintenance of sagebrush, and increased plant succulence by periodic removal of rank vegetation. FIGURE 3-4 schematically illustrates the cause and effect relationships of these impacts. The important meadows in HT-13 and 27 would be ungrazed on two-thirds of the study area for most of the brooding season. Heavy grazing would occur on one-third of the study area season long and another one-third in the Treatment B pasture from mid-summer until the end of the grazing season. Livestock concentrations on Treatment A areas would increase nest loss due to trampling on one-third of the area. Nest loss from this cause would be eliminated on areas under the other two treatments. Meadows (HT-13 and 27) would be expected to improve but in 15 years would not be expected to reestablish in areas where meadow vegetation was replaced by less desirable species.

The overall impacts expected on the sage grouse population would be slight to moderate increase in number of birds. The impacts of systematic grazing on sage grouse would be greatest in the Bare, Home Camp, and Tuledad Allotments.

CHUKAR

The natural increases in spring flows and longer duration of intermittent streamflows, expected as a result of the systematic grazing would expand suitable chukar habitat. Renewed permanent water sources would allow chukar to expand populations into new habitat. Amount of expansion possible cannot be predicted but would be expected to be slight after 15 years.

QUAIL

In 15 years, quail habitat in the study area, which is now in poor condition, would improve in some habitat type (HT-27) for both food and cover, as well as for their dominant need to be close to water. Slight increase in willows would not substantially improve roosting cover essential to quail survival. Grass and forbs would be expected to increase in this habitat type and would provide more grass leaves and weed seeds, the mainstay of the quail's diet. The quail population would not be expected to respond positively or negatively after 15 years.

WATERFOWL

Important waterfowl nesting habitats (HT-23 and 27) are in poor condition for waterfowl because they are heavily grazed each year leaving little residual vegetative cover. These habitat types would respond to systematic grazing by increasing plant density and litter (residual vegetation) similar to increases experienced on allotments in Montana by Gjersing (1975) (FIGURE 3-5). Mundinger (1976) states that his studies of the same area indicate that rest-rotation contributed to an overall improvement of this allotment as habitat for breeding waterfowl. An increase in waterfowl production would be expected on the 1,970 acres of waterfowl habitat under systematic grazing in the study area.

In Gjersing's (1975) study, duck broods increased from 33 to 77 (130 percent) in the first three years of the system. In the study area, there would be only a moderate increase in nesting waterfowl since neither the two- or three-pasture grazing systems provide the rest and protection of residual vegetation from the previous year's growth that supports highest densities of nesting ducks.

NONGAME SPECIES

As stated in Chapter 2, Animals, interspersion of habitat types and condition of HT-13, 23, 25, 26, and 27 are the most important factors in the quality of habitats for a wide variety of species. Conditions are currently poor in HT-13, 26, and 27. Anticipated effects of the grazing systems within 15 years would be a gradual improvement of general habitat condition of HT-13 and 27, but HT-26 is expected to be adversely affected and aspen would not be expected to respond favorably.

Annual grazing, by livestock, on roughly two-thirds of the study area would remove food and cover required by many species. Increased spring flow would improve water distribution and enhance habitat for some nongame species. FIGURE 3-6 depicts the cause and effect relationships between nongame species and the proposed grazing systems.

The effects of grazing systems on nongame species have not been well documented and opinions and observations differ greatly. Buttery and Shields (1975) state, "Any benefit to bird habitat on the deferred or rested pasture is likely to be offset by heavy use of the grazed pasture." Some

FIGURE 3-4
LONG-TERM IMPACTS - SAGE GROUSE

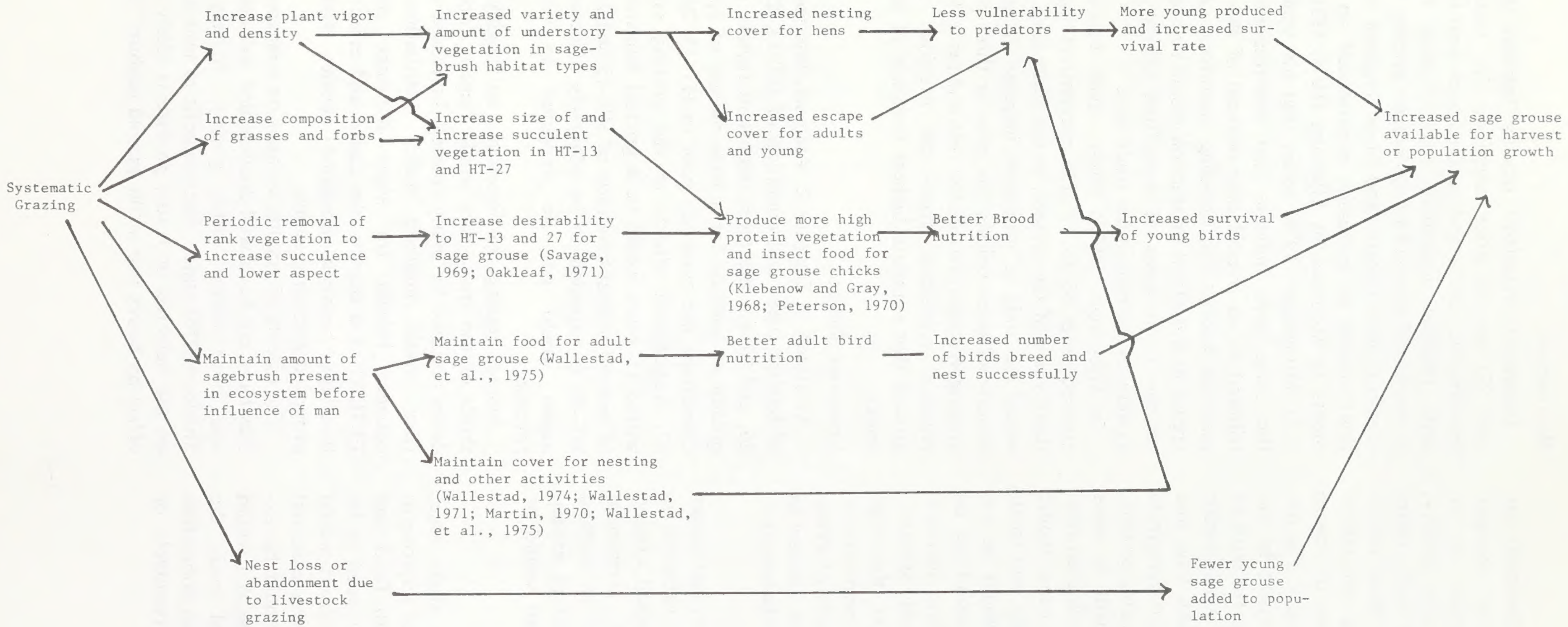

Systematic Grazing
Increase plant vigor and density
Increase composition of grasses and forbs
Periodic removal of rank vegetation to increase succulence and lower aspect
Maintain amount of sagebrush present in ecosystem before influence of man
Nest loss or abandonment due to livestock grazing
Increased variety and amount of understory vegetation in sagebrush habitat types
Increase size of and increase succulent vegetation in HT-13 and HT-27
Increase desirability to HT-13 and 27 for sage grouse (Savage, 1969; Oakleaf, 1971)
Maintain food for adult sage grouse (Wallestad, et al., 1975)
Maintain cover for nesting and other activities (Wallestad, 1974; Wallestad, 1971; Martin, 1970; Wallestad, et al., 1975)
Increased nesting cover for hens
Increased escape cover for adults and young
Produce more high protein vegetation and insect food for sage grouse chicks (Klebenow and Gray, 1968; Peterson, 1970)
Better adult bird nutrition
Less vulnerability to predators
Better Brood nutrition
Increased number of birds breed and nest successfully
More young produced and increased survival rate
Increased survival of young birds
Fewer young sage grouse added to population
Increased sage grouse available for harvest or population growth

FIGURE 3-5

Long-term Impacts--Waterfowl

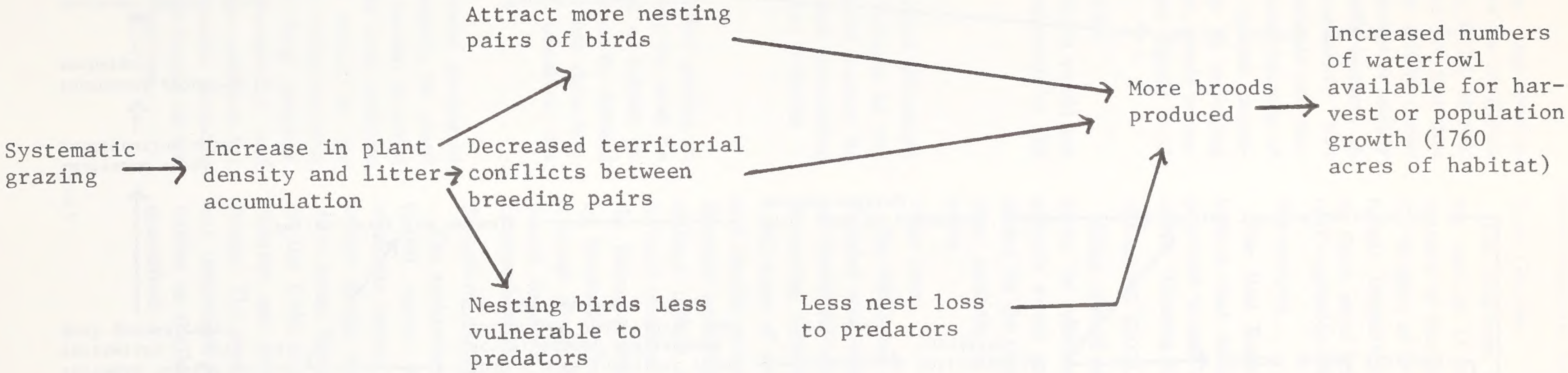
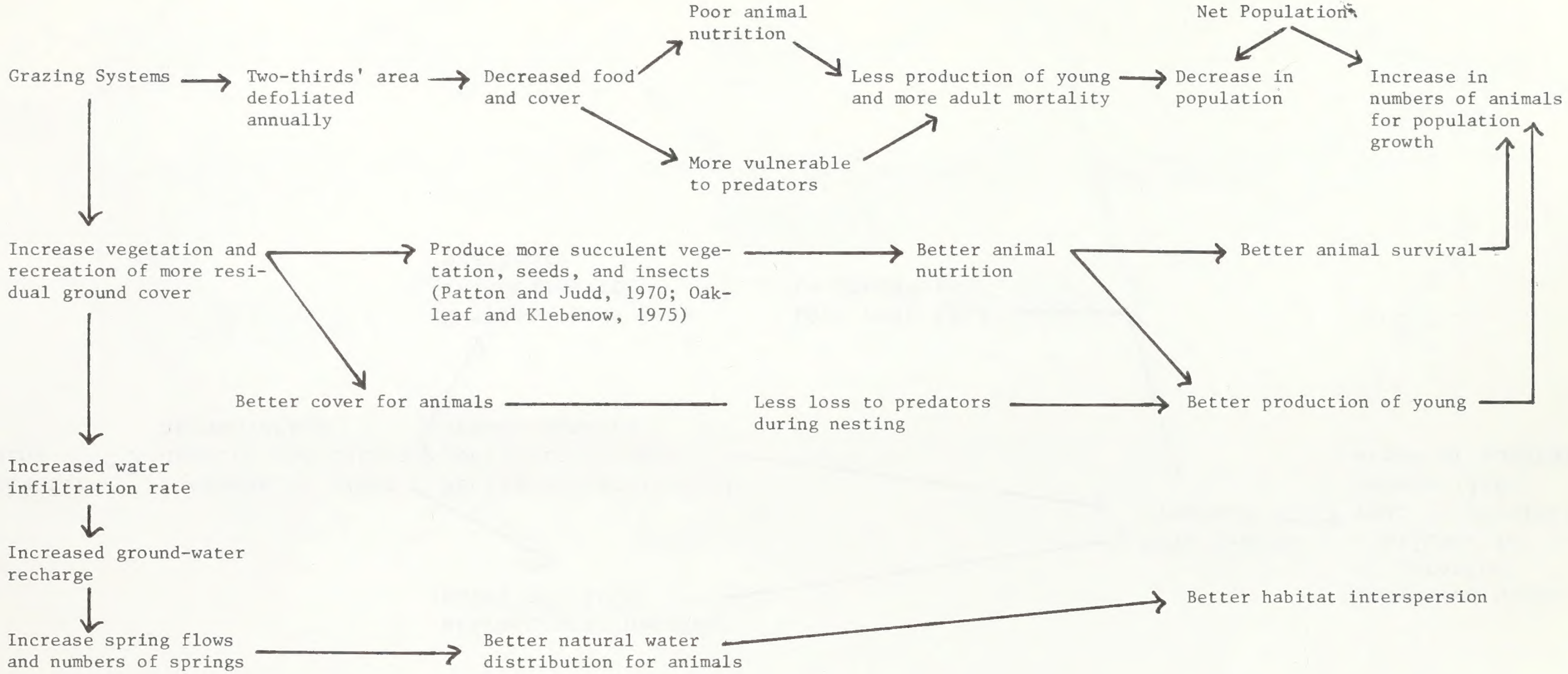

Systematic grazing
Increase in plant density and litter accumulation
Attract more nesting pairs of birds
Decreased territorial conflicts between breeding pairs
Nesting birds less vulnerable to predators
Less nest loss to predators
More broods produced
Increased numbers of waterfowl available for harvest or population growth (1760 acres of habitat)

FIGURE 3-6
LONG-TERM IMPACTS--NONGAME ANIMALS


Grazing Systems
Two-thirds' area defoliated annually
Decreased food and cover
Poor animal nutrition
More vulnerable to predators
Less production of young and more adult mortality
Net Population
Decrease in population
Increase in numbers of animals for population growth
Increase vegetation and recreation of more residual ground cover
Produce more succulent vegetation, seeds, and insects (Patton and Judd, 1970; Oakleaf and Klebenow, 1975)
Better animal nutrition
Better animal survival
Better cover for animals
Less loss to predators during nesting
Better production of young
Increased water infiltration rate
Increased ground-water recharge
Increase spring flows and numbers of springs
Better natural water distribution for animals
Better habitat interspersion

individuals feel that, on some rest-rotation systems in Montana, residual cover for songbirds has been increased (U.S. Dept. Int., BLM, 1971b). Because of divergent opinions and the fact that nongame species populations often exhibit cyclic fluctuations independent of the amount or quality of their habitat, attempts to quantify impacts on nongame animals would be inconclusive. Net long-term impacts on nongame animals are predicted to be slight population increases because of habitat improvement. However, species dependent on the aspen habitat, such as red-tailed hawks, goshawks and woodpeckers, would be expected to remain stable or decrease slightly in 15 years.

THREATENED OR ENDANGERED SPECIES

The bald eagle and peregrine falcon would not be expected to be significantly impacted by the proposed systematic grazing.

CUSTODIAL MANAGEMENT

Short-Term Impacts

The short-term impacts on custodial allotments for all species would be small because of the small acreage involved. The impacts cannot be defined and analyzed because data concerning their current habitat condition are not available.

Long-Term Impacts

MULE DEER

The long-term impacts of custodial grazing at the end of 15 years would generally be small on deer because of the small amount of habitat involved (3,580 acres). Impacts cannot be defined and analyzed on these areas because data concerning their current vegetative condition are unavailable.

PRONGHORN ANTELOPE

The long-term impacts of custodial grazing at the end of 15 years would generally be small because of the small amount of habitat involved (2,280 acres or 0.3 percent of the total antelope range). One notable exception would be the Highway Allotment on Duck Flat which contains 1,360 acres of important year-long antelope habitat (thick sagebrush and greasewood) and would continue to remain in poor condition for antelope as long as it remained under custodial management. The magnitude of the impact on the antelope cannot be determined at this time.

SAGE GROUSE

The long-term impacts of custodial grazing at the end of 15 years would generally be small because of the small amount of habitat involved (1,750 acres or 14 percent of the total sage grouse range). Impacts cannot be defined and analyzed on these areas because data concerning their current vegetation condition are unavailable.

WATERFOWL

The Red Rock Allotment contains waterfowl habitat that would be fenced as part of the proposed action and therefore will be discussed under "Grazing Exclusions," below.

GRAZING EXCLUSIONS

Many special areas would be reserved by exclosures or elimination of grazing. Impacts on animals would generally be similar to those predicted for the rest treatment pastures in the short-term analysis of systematic grazing system impacts.

Mule Deer

The 480 acres excluded for deer in the North Tuledad area would have an immeasurably small, yet beneficial impact on the deer population by increasing bitterbrush available for deer. The 1,662 acres of springs and reservoirs and riparian and aquatic areas excluded from livestock would increase succulent green forage for deer but the amount cannot be estimated. A small amount (several thousand acres) of deer habitat occurs in the Bicondoa Allotment that would be ungrazed by livestock. The 40 acres of aspen protected as a result of the Cottonwood Mountain exclosure would improve the area for deer cover and fawning habitat.

Pronghorn Antelope

The exclusion of Garden Lake and Grass Lake (1,040 acres) from livestock grazing would eliminate spring and summer competition for antelope during dry years when they heavily use these areas. Competition would also be eliminated on the 1,662 acres of springs and reservoirs and riparian and semi-aquatic areas where antelope forage. The area protected makes up a very small yet important percentage of the total antelope habitat in the study area but impacts cannot be quantified.

Sage Grouse

The exclusion from grazing of the springs, reservoirs, and meadows and of riparian and other wet areas (2,762 acres) would eliminate competition for spring and summer forbs. The results of the elimination of competition are discussed under short-term impacts of the systematic grazing systems. The amount of area which would be protected, however, would make up a very small percentage of brood meadows in the study area. A long-term adverse impact of the exclusions might be disuse of the areas by sage grouse because of the rank vegetative growth accumulated over the years.

Quail

Exclusion of spring and riparian areas would remove willow, wild rose, and other shrubs important to quail for cover from grazing. Quail reproduction and survival would increase on these areas. Overall quail population response would be small because of the small percentage of riparian habitat that would be protected.

Waterfowl

The increase in number of nesting pairs and the reproductive success of waterfowl would be expected to be high on Red Rock Lake and Snake Lake, due to the predicted increase in bank and upland cover resulting from the exclusion of livestock. Because of the limited amount of waterfowl habitat in the study area, the protection of Red Rock Lake and Snake Lake would improve waterfowl populations on the study area significantly.

Nongame Species

The exclusion of springs, reservoirs, and meadows, and of aspen, riparian, and baltic rush areas would protect food and cover for these species. Protected aspen stands (40 acres) would increase in height and variety of understory vegetation, which would benefit many species. Mature aspen stands, important to many animals for nesting, would be maintained by reproductive sprouting. The protected areas would be islands in a large area of less suitable habitat. Increased contribution to the population would be small.

Threatened or Endangered Species

Suitable habitat for the California bighorn sheep, listed as rare by the California Fish and Game Commission, occurs in the Bicondoa Allotment. The exclusion of grazing in the Bicondoa Allotment would eliminate competition for perennial grasses, the only apparent limiting factor for bighorns in the area. The herd size that could be sustained in the area would be less than 100 sheep.

The bald eagle and peregrine falcon would not be expected to be impacted by the proposed exclusions.

FACILITIES TO IMPLEMENT THE PROPOSAL

The net effects of the planned water developments on wildlife would be positive for species requiring free water. They would increase populations of upland game birds, some nongame birds, and mammals. Slight increases could also be possible in waterfowl production. The impacts on species not requiring free water would be adverse, caused by the spread of livestock use made possible by water distribution.

The greatest impact of fencing would be to reserve wildlife habitat from livestock grazing. The protection of crucial areas might outweigh the adverse impact of deer and antelope entrapment and injury.

Short-Term Impacts

Many short-term adverse impacts would be common to many of the improvement practices. Frightening animals from their home range and disrupting their daily behavior would cause animals to move to other areas and possibly become more vulnerable to predators. Heavy equipment used for earthmoving or excavation could destroy the home ranges of small mammals, reptiles, and ground-nesting birds, as well as the animals themselves.

Big game would quickly move back into an area after people have gone; small animal species would move in from the periphery to occupy habitats left vacant by animals destroyed. Because these effects would be of short duration and on small areas, the magnitude of these adverse impacts would be slight.

Long-Term Impacts

All impacts will be discussed on the study area as a whole unless certain improvements on specific allotments would be expected to differ greatly in kind or magnitude of impact.

WATER DEVELOPMENTS

Water developments cause two major long-term effects on wildlife habitat. They improve water distribution for the enhancement and expansion of habitat for those wildlife species needing free water and they expand the areas useable to livestock. Improved distribution of water improves habitat for many wildlife species.

Beneficial impacts on deer and antelope would come in the form of better animal distribution, less energy expended going to and from waters, and less susceptibility to predators at particular waters. The impact would be that deer would be in better condition and better equipped for survival. The magnitude of this impact would be impossible to measure because of the number of variables involved.

Beneficial impacts on sage grouse, quail, and chukar would come in the form of increased brood-rearing habitat where young, flightless birds could satisfy their water requirements. The impact would be better brood survival because young birds would not die of thirst or be as vulnerable to predators at water sources.

Nongame insectivorous birds, reptiles, and amphibians would benefit from the increase in the insect supply and variety caused by greater water distribution and the succulent vegetation resulting from it. Small rodents would also benefit (Buttery and Shields, 1975). The impact of this would be more animals to occupy the habitat created by increased water distribution, but magnitude of the impact cannot be predicted.

A larger prey base would provide a larger food supply for predatory birds and mammals. The cyclic nature of small-animal populations and limiting factors such as weather and wildfire could have much more influence on animal numbers than the water developments proposed.

Improved distribution of water would also allow livestock to graze areas they previously could not. Quantification of this is not possible. Making new areas suitable for livestock grazing would increase the acreage upon which the adverse impacts of livestock grazing could occur. Increasing water distribution would increase competition between the wildlife species that inhabited the area before water development and do not need free water and the species that would occupy the area with the addition of water. The impact of this competition is unknown.

The land covered with troughs, storage tanks, and concrete pads would eliminate a small amount of acreage from wildlife use, but this would be insignificant.

SPRINGS

The impacts discussed under "water developments" apply to springs along with the following additional impacts.

Springs would be developed to allow first priority water to wildlife at the source; the source would be fenced to protect meadow or wet-acre vegetation. This would allow the accumulation of shrub vegetation and clean, undisturbed water. This "oasis" would provide a favorable environment for all wildlife species requiring riparian or wet-meadow habitat types as part of their habitat. Insects, amphibians, and certain small birds and mammals would particularly benefit from this action. Numbers would increase because of created or improved food, water, and cover. Populations of predatory birds and mammals would also show an increase, though somewhat more conservatively.

RESERVOIRS

Of the 65 reservoirs planned, 42 would be of pit type, and 23 would be created by dikes. The reservoirs built with dikes would cover upland animal habitat with earth and water. No critical habitats would be covered and the acreage involved would be small (20–40 acres) in relationship to the study area; therefore, this impact is considered insignificant. Six of these reserviors would be fenced to allow maximum development of emergent, aquatic, and bank vegetation, making these projects more attractive to wildlife and nesting waterfowl. The annual production of young would increase. This would be a small beneficial impact. The fence around each project would have impacts similar to the impacts discussed under "Fences," below. Big game animals would be likely to drink at troughs provided for livestock outside the fenced area. The succulent vegetation inside the fenced area would be likely to attract big game species, and deer or antelope could be caught in the fence. This would be unlikely because (1) the fence design would minimize catches, and (2) big game species are much more vulnerable to being caught when they are in a weakened condition during the winter when the fenced areas would not be attractive. There is potential adverse impact, but it is very slight.

The pit-type reservoirs would cover 50–100 acres in the study area and disturbed areas would be reseeded after construction. Impacts of these projects would be insignificant because most of the construction sites are in areas seasonally flooded already.

WELLS AND WINDMILLS

Wells and windmills would create the same impacts as stated under "Water Developments," above, with no other significant impact. Water would be pumped even when the pasture and well were not being used by livestock if wildlife values are great enough to warrant the added expense.

PIPELINES

The impacts discussed under "Water Developments" apply to pipelines; no additional long-term impacts would be anticipated. Pipelines would be developed along the same criteria as springs, so impacts would be nearly the same.

FENCES

Approximately 99 miles of fences are planned for the proposed action. The main species impacted by fences would be deer and antelope. The fences proposed in Chapter 1 would be designed to have a minimal chance of entangling big game. Some big game contact with fences would be probable.

Deer or antelope could be startled by predators or people and accidentally run into a fence. Animals in a weakened condition, could become entangled in fences and might starve or die of shock or exposure. An animal cut or scratched by a fence would be exposed to infection or disease and would possibly be more susceptible to a predator or other mortality factor. The magnitude of this adverse impact would be expected to be small. Eight miles of fence would be constructed on deer winter range and 11.3 miles would be constructed on antelope winter range. Unlike Wyoming's Red Desert area, where fence-animal conflicts are high, (Spillett, et al., 1967) the study area has a low antelope density, moderately severe winter weather conditions, and no sheep-tight fences. The miles of fences which would occur on deer and antelope winter ranges are shown by allotment in TABLE 3-10. Animals on three of the allotments would have no conflicts between proposed fences and winter range; the Tuledad Allotment would have the greatest potential for adverse impacts, with 7.6 miles of fence on winter ranges. The magnitude of the impact (numbers of animals that would be lost) cannot be estimated with reliability.

Fences do not appear to affect birds in a negative manner. Certain species, such as raptors and shrikes (Buttery and Shields, 1975), which use fenceposts and wires to perch upon while hunting might, in fact, benefit by their presence. Shrikes also use fence wire barbs to impale prey. The perch sites would allow the birds to be more effective hunters, thus improving their condition and ability to survive. However, this impact would be negative for the prey species.

RESEEDING TESTS

Short-Term Impacts

The short-term results of the proposed chaining and seeding would be disturbance of soil and vegetation on approximately 160 acres, leaving only a 4-5 percent canopy coverage. Establishment of seeded vegetation might take from two to four years and leave the ground nearly bare during the interim.

Small, less mobile animals would be drastically affected by the proposed land treatment. Short-term impacts on small birds and mammals would be the elimination of these animals from the treatment site for the season during which the treatment were to take place. Rodents would be crushed during the operation and their burrow systems would be partially destroyed, as would their food supply. Rodents would quickly reinhabit the treatment site from surrounding, untreated areas. This would probably occur within the first year after treatment.

Small bird nesting, feeding, and escape cover sites would be destroyed for at least the first year and probably several years thereafter until the seeded species became established. Adverse impacts on small mammal and ground nesting bird populations would be severe.

Long-Term Impacts

The seeding tests would be on such a small scale in relation to the size of the study area that long-term impacts from them would be insignificant.

Aquatic Animals

The impact of livestock grazing on an aquatic habitat is dependent upon: (1) the season of use; (2) the duration of use; and (3) the number of grazing animals per unit area. The proposed action calls for the implementation of systematic livestock grazing on 63 percent (12.17 miles) of public streamside and 100 percent (2.65 miles) of

TABLE 3-10

MILES OF FENCE ON DEER AND ANTELOPE WINTER RANGES

Allotment	Antelope Winter Range	Deer Winter Range
Denio	1.4	2.7
Wall Canyon	0	0
Bare	3.2	.2
Lower Lake	0	0
Duck Lake	2.8	0
Home Camp	1.4	0
Selic-Alaska	0	0
	11.3	8.0

reservoir shoreline. Full habitat protection would be provided on 4.33 miles (25 percent) of streamside by fencing. Impacts are analyzed in TABLE 3-11 on an individual stream and allotment basis.

SYSTEMATIC GRAZING MANAGEMENT

The three-pasture grazing system would impact 4.12 miles (37.5 percent) of public streamside in the Tuledad Allotment and a total of 6.25 miles (100 percent) of public streamside in the Duck Lake and Wall Canyon Allotments. The two-pasture system would impact 1.8 miles of streamside in the Selic-Alaska Canyon Allotment. Seven out of eight streams (90 percent) would be impacted. A total of 2.65 miles of reservoir shoreline (2.0 miles in the Duck Lake Allotment and 0.65 miles in the Tuledad Allotment) would be impacted.

Short-Term Impacts

TREATMENT A

Treatment A would result in the most adverse impacts on the aquatic community. During the treatment, livestock densities along accessible sectors of stream and reservoir shoreline would be two (Selic-Alaska Canyon Allotment) and three (Tuledad, Duck Lake, and Wall Canyon Allotments) times greater than exists under current use. Livestock selectively seek out the green forage, water, and shade that exist in the stream-riparian zone. This condition would become increasingly evident during late summer when intermittent water supplies would be exhausted or where upland water developments would be minimal. Drought years would further increase livestock dependence on the aquatic habitat. The duration of use would be identical to the current grazing. The seedripe pasture would be opened on approximately August 1, but there is no proposed measure to force livestock into the Treatment B pasture after "proper use" has been achieved.

This increase in grazing pressure would mean that the riparian community—already in poor condition from present grazing habits—would continue to decline. Bank cover and valuable shade-producing shrubs would be exposed to increased consumption. The trampling of most banks and shorelines would cause a decline in bank steepness and stability, an increase in channel width, and an increase in bare ground. The net result for cold-water fish would be: (1) a loss of suitable cover and living space; (2) a loss in reproductive capacity; (3) a loss in desirable food species; and (4) unfavorable water temperatures. These conditions could result in reduction in habitat carrying capacity, through physiological stress, disease, and potential replacement by more tolerant species. Warm-water fishes would be similarly affected. The addition of suspended and dissolved substances in the water would reduce the depth of solar radiation, resulting in a decline in biological productivity. Inversely, the heat-absorbtion capabilities would be elevated by the increase in particulate matter, thereby causing an increase in the range of daily water temperatures. The trampling and subsequent consumption of shoreline flora would reduce the amount of available cover for reproduction and survival.

TREATMENT B

Treatment B would occur every third year in each pasture in the Tuledad, Duck Lake, and Wall Canyon Allotments but would only be partially obtained during the use year in the Selic-Alaska Canyon Allotment. The late turnout date (July 1) for the use pasture will partially fulfill this requirement in the two-pasture system. The amount of stream area impacted would be identical to Treatment A.

The primary benefit to be derived from Treatment B would be a reduction in the season of use. The Tuledad Allotment would sustain a reduction of 60 percent while Duck Lake and Wall would receive a 75- percent reduction in months of use as compared to Treatment A. The Selic-Alaska Canyon Allotment would sustain a later turnout date (July 1) as compared with the other allotments.

Livestock would reduce vegetative height as described for Treatment A. The impact of reducing the height of streamside vegetation during the seed-ripe treatment (B) is important for two reasons: (1) it would occur during the late summer, traditionally the hottest period of the year, at a time when seasonal water levels are at their lowest; and (2) it would inhibit plant regrowth, which is important in the protection of streambanks during peak flow periods in the spring. Gjersing (1975) points out the swiftness at which livestock can reduce the height of vegetation along a shoreline—within two weeks after turnout, cattle grazing and trampling had reduced all vegetation within 15 feet of a reservoir to a height of 3 inches or less. Duff (1977) further reported that after four years of rest livestock graz-

TABLE 3-11
UTILIZATION OF FISHERIES HABITAT

			CURRENT USE				PROPOSED ACTION			
Number	Name	Allotment	Miles of Public Streamside	# of Mi. Grazed	# of Mi. Inaccessible	# of Mo. of Use	# of Mi. Exclusions	# of Mi. Grazed	Reduc. in Miles of Stream Grazed (%)	Reduc. in Time of Use (%)
1.	Bare Creek	Tuledad	4.0	3.5	0.5	6	3.0	0.5	87.5	33
2.	Silver Creek	Tuledad	2.5	0.75	1.75	6	0	0.75	0	33
3.	Emerson Creek	Tuledad	1.0	1.00	0	6	1.0	0	100.0	100
4.	North Creek	Tuledad	1.0	0.5	0.5	6	0	0.5	0	33
5.	Barber Creek	Tuledad	2.5	2.5	0	6	0.13	2.37	5.0	33
		ALLOTMENT TOTAL	11.00	8.25	2.75	6	4.13	4.12	50.0	53 (avg.)
6.	Alaska Canyon Creek	Selic-Alaska	1.0	1.0	0	3	0.1	0.9	10.0	50
7.	Selic Canyon Creek	Selic-Alaska	1.0	1.0	0	3	0.1	0.9	10.0	50
		ALLOTMENT TOTAL	2.0	2.0	0	3	0.2	1.8	10.0	50 (avg.)
8.	Wall Canyon Creek	Wall Canyon	3.25	3.25	0	5	0	3.25	0	33
9.	Wall Canyon Creek									

ing reduced the rating for cover and bank stability by 35 percent and 14 percent, respectively, in a six-week period. Streambanks which had become grassed over were denuded. Relatively stable banks were refractured and began sloughing into the stream. As much as 3 feet of bank was lost in certain areas. End-cutting around logs and instream devices were common as was accelerated bank erosion. Willows which had reached heights of 48 inches were reduced to basal stems. The mean channel width exhibited a one-foot loss. All of these abuses occurred along a half-mile stretch of streambank previously fenced to exclude cattle use.

TREATMENT C

A year of rest would be provided every third year for each pasture in the Tuledad, Duck Lake, and Wall Canyon Allotments and every other year in the Selic-Alaska Canyon Allotment. Shoreline vegetation would not be removed by domestic livestock during this year. All of the current year's growth would be available for shade, erosion control, and channel and bank stability. The height of shade-producing plants, however, would be limited due to previous removal of vegetation by livestock.

Long-Term Impacts

The net effect of the grazing treatments would be a continuation of the downward trend in the aquatic communities. It would not be anticipated that one year of rest would be sufficient to greatly improve bank stability and vegetative cover. Duff (1977) determined that possibilities exist for limited grazing use in riparian zones if sufficient time is given for vegetative recovery and streambank stabilization to occur. Without this initial period of rest degraded riparian habitats would continue to sustain substantial habitat loss or decline. However, where fencing of some portions of streams provides for vegetative recovery, these streams could experience improved conditions which would result in improved habitat. This would, in turn, allow for increased fish population in these areas, thereby improving the overall productivity of the stream.

GRAZING EXCLUSIONS

Livestock exclosures provide riparian communities with the capacity for unrestricted vegetative growth and recovery. As provided for in the proposed action, no livestock grazing would be allowed along 4.33 miles of public streamside. Five streams—Bare Creek (3.0 miles), Emerson Creek (1.0 mile), Barber Creek (0.13 mile), and Alaska and Selic Canyon Creeks (0.1 mile each)—would be impacted by exclosures.

It has been well documented that fencing portions of a streambank to promote increased vegetation is a practical method for providing shade and for stabilizing streambanks. Duff (1977) reports that bank cover increased from a low 35-percent rating (bare soil) to a 40-percent rating (grass-brush, medium height) in a four-year period following the construction of a livestock exclosure. Similarly, streambank stability increased from "mostly unstable" to "greater than 50 percent stable" during the same period. Mean channel widths decreased while depth and instream cover improved from stabilized undercut banks. It would be anticipated that Bare and Emerson Creeks would achieve similar results.

Fencing small isolated segments of streamside would not provide full habitat recovery. Certain highly segmented streams—Barber, Alaska, and Selic Creeks—are greatly influenced by much larger intervening parcels of privately owned land. Fencing these miscellaneous segments would not promote any significant change in the condition of the overall habitat or the quality of the water. These exclosures would be monitoring devices aimed at assessing the benefits gained through fencing as compared to nonfencing under systematic grazing management.

TABLE 3-12 summarizes anticipated short-term and long-term impacts on fisheries as a result of implementing the proposed action.

WILD HORSES

Systematic Grazing Management

FIRST-YEAR IMPACTS

Treatments A and B would have an adverse impact on horses by increasing competition for forage and space with livestock. In the Tuledad Allotment during Treatment A, there could be as many as 1,500 cattle and 4,000 sheep using the pasture for about four months, from April 1 to seedripe (approximately July 31) of key species. In the Hog Mountain pasture of the Bare Allotment during Treatment A, there could be as many as 1,800 to 2,100 head of cattle in the pasture from May 1 to seedripe. In pastures under Treatment B, the operator would move all of the livestock from the Treatment A pastures to the

TABLE 3-12
SUMMARY OF IMPACTS ON FISHERIES

Stream Name	Allotment	Cause of the Impact	Miles of Public Land Impacted	Short-term Impacts	Long-term Impacts
Bare Creek	Tuledad	Elimination of livestock grazing	3.00	Growth of riparian vegetation would increase as would bank stability. Improvement in rate of sedimentation and water temperature would be anticipated.	Overall condition of the habitat would improve.
		Three-pasture rest-rotation grazing system.	1.00	Poor accessibility would restrict the majority of livestock to the lower 0.25 mile below the exclusions. Grazing two out of three years would cause a decline in vegetative cover and bank stability and an increase in water temperature and rate of sedimentation.	The lower 0.25 mile would continue to decline. It would not be anticipated that the upper 0.75 mile would change significantly.
Barber Creek	Tuledad	Elimination of livestock grazing.	0.125	No change in the present dense stand of riparian vegetation would be anticipated.	No significant change would be anticipated.
		Three-pasture rest-rotation grazing system.	2.38	Little overall improvement in vegetative cover, bank stability, sedimentation and temperature control would be anticipated.	Decline in habitat condition would continue.
Newland Reservoir	Tuledad	Three-pasture rest-rotation grazing system.	0.65	It would not be anticipated that there would be any significant improvement in the condition of the shoreline or the quality of the waters after one grazing cycle.	Little change would be anticipated.

TABLE 3-12 (Continued)

Stream Name	Allotment	Cause of the Impact	Miles of Public Land Impacted	Short-term Impacts	Long-term Impacts
Emerson Creek	Tuledad	Elimination of livestock grazing.	1.00	Growth of riparian vegetation would increase as would bank stability. Erosion and silt deposition would decline and water temperature would show slight improvement.	Only a slight improvement in overall stream quality would be expected as a result of improving 29 percent of stream area.
		Three-pasture rest-rotation grazing system.	2.50	Little overall improvement in vegetative cover, bank stability, sedimentation and temperature control would be anticipated.	The decline in the overall stream quality would continue but at a reduced rate.
Silver Creek	Tuledad	Three-pasture rest-rotation grazing system.	2.5	Poor accessibility in the upper 2.0 miles restricts livestock movement. Little overall impact would be anticipated.	Little change would be anticipated.
North Creek	Tuledad	Three-pasture rest-rotation grazing system.	1.0	Little change would be anticipated.	Little change would be anticipated.
Wall Canyon Reservoir	Duck Lake	Three-pasture rest-rotation grazing system.	2.00	It would not be anticipated that there would be any significant improvements in the condition of the shoreline or the quality of the waters after one grazing cycle.	Little change would be anticipated.

TABLE 3-12 (Continued)

Stream Name	Allotment	Cause of the Impact	Miles of Public Land Impacted	Short-term Impacts	Long-term Impacts
Selic Canyon Creek	Selic-Alaska Canyon	Elimination of livestock grazing.	0.10	Growth of riparian vegetation would increase as would bank stability. No improvement in stability or water temperature would be anticipated.	The exclosure is too small to make any significant change in the quality of of the fisheries.
		Two-pasture rest-rotation grazing system.	0.9	The two-pasture system would provide 50 percent more rest. Growth of riparian vegetation would improve.	A fair rating would be anticipated, depending on the extent of the damage caused in the use year.
Alaska Canyon Creek	Selic-Alaska Canyon	Elimination of livestock grazing.	0.10	Growth of riparian vegetation would increase as would bank stability. No improvement in stability or water temperature would be anticipated.	The exclosure is too small to make any significant change in the quality of the fisheries.
		Two-pasture rest-rotation grazying system.	0.9	The two-pasture system would provide 50 percent more rest. Growth of riparian vegetation would improve.	A fair rating would be anticipated, depending on the extent of the damage caused in the use year.

Treatment B pastures for the remainder of the season, until October 31.

There will also be 45 new water developments in wild horse areas of the Tuledad and 3 in the Bare Allotments. Some developments would be located in areas previously used only by horses. This would add greatly to the competition for forage and space with livestock.

Treatments A and B would create the greatest potential impact on horses because of the possibility of limited winter forage. The severity of the impact would depend greatly on actual use by livestock, current year's growth of forage, and weather conditions.

Since wild horses can use rockier, steeper areas than domestic livestock and have the ability to compete for forage and survive under very adverse conditions, it seems reasonable that the 100 and 50 wild horses in the Tuledad and Fox-Hog Mountain Herd Management Areas, respectively, would be able to exist under Treatments A and B.

Treatments A and B would create increased concentrations of cattle which would cause an increase in competition for space, but this would not be expected to seriously disturb the horses' normal habits since wild horses and livestock have been observed in the same or in greater concentrations in other areas. Increased human activity required to work and herd livestock would cause more disturbance. Horses would try to avoid the disturbance and return to their normal activities when the disturbance stopped. However, human activity would be for a short period so that any disturbance would be minimal.

Treatment C would provide for less competition for forage since there would be no livestock grazing except in the Tuledad Allotment when sheep may be trailed through the rest pasture. The impact on horses would be beneficial since more forage would be available and there would be less disturbance.

SHORT-TERM IMPACTS

Short-term impacts would be basically the same as discussed under first-year impacts except that the degree of impact might have changed. Horses might have adjusted to the grazing system, such as finding areas that would not be heavily utilized by livestock.

LONG-TERM IMPACTS (15 YEARS)

Long-term impacts would be due to vegetation changes in the habitat types used by horses. All but one of these habitat types were in fair condition so in 15 years they would have improved to a "good" range condition class rating. The changes would be generally from shrub-dominated to perennial-grass-dominated habitat types, which would be beneficial for the horses since they prefer grasses as their main source of food. One of the habitat types in the Hog pasture is already in excellent range condition and little change would be expected.

Grazing Exclusions

There are a number of meadows, springs, lakebeds, and reservoirs that would be fenced to exclude livestock grazing. A number of these would be located in wild horse areas and are listed in TABLE 3-13. As shown there would be approximately 753 acres that would be excluded from wild horse grazing. The Garden Lake Project (#197) accounts for 640 acres of the total and is located in a horse concentration area in the Cottonwood pasture. Horses graze in the lakebed and there are several horse trails that traverse the area.

However the lakebed and the other excluded areas would make up such a small percentage of the horse area that their exclusion from grazing would not be a significant impact on the horses.

Facilities to Implement the Proposal

CONSTRUCTION

TABLE 3-14 lists projects that would be located in wild horse areas by allotment and pasture. These projects are shown in MAP 1-8.

Project construction would disturb wild horses by increasing human activity. The projects would be constructed over a 2-3 year period but the length of time required to complete each project would be relatively short. The disturbance might cause the horses to move out of an area during construction but they would return shortly after project completion. The disturbance would be for a very short period and would not cause any serious impacts.

FIRST-YEAR IMPACTS

The major impacts of the facilities listed in TABLE 3-14 would be injuries and restriction of free movement resulting from fence construction in wild horse areas. Barbed wire fences could cause serious injuries when horses would collide or become entangled in them. They could also become a physical barrier which might prevent

TABLE 3-13
FACILITIES TO EXCLUDE LIVESTOCK GRAZING IN WILD HORSE AREAS

	Type of Project	Project Number	Acres
TULEDAD ALLOTMENT			
Cottonwood Pasture	4 Springs	12, 20, 22, 116	1
	2 Meadows	195, 196	60
	1 Aspen	194	40
	1 Wildlife	197	640
	2 Reservoirs	5, 132	4
TOTAL	10		745
Coppersmith Pasture	2 Springs	70, 94	1
	3 Reservoirs	115, 117, 119	6
TOTAL	5		7
Bare Pasture	1 Spring	33	1
BARE ALLOTMENT			
Hog Mountain Pasture	2 Springs	61, 174	1
GRAND TOTAL	18		753

TABLE 3-14
FACILITIES TO IMPLEMENT PROPOSAL IN WILD HORSE AREAS

	Type of Project	Project Number	Fencing Required
TULEDAD ALLOTMENT			
Cottonwood Pasture			
Water Developments	4 Springs (fenced)	12, 20, 22, 116	0.2 miles
	24 Pit Reservoirs (unfenced)	1, 2, 3, 6, 7, 8, 9, 10, 17, 48, 55, 57, 113, 114, 126, 127, 128, 131, 154, 166, 167, 170, 180, 181	None
	2 Dike Reservoirs (fenced)	5, 132	0.5 miles
	5 Dike Reservoirs (unfenced)	11, 18, 27, 30, 184	
TOTAL	35		0.7 miles
Wildlife Exclosures	2 Meadows	195, 196	1.0 miles
	1 Aspen	194	1.0 miles
	1 Antelope	197	4.0 miles
TOTAL	4		6.0 miles
Other Facilities	1 Pasture fence	186	19.0 miles
	3 Cattleguards	199, 200, 201	
TOTAL	4		

TABLE 3-14 (Continued)

	Type of Project	Project Number	Fencing Required
TULEDAD ALLOTMENT			
Coppersmith Pasture			
Water Developments	2 Springs (fenced)	70, 94	0.3 miles
	1 Pit Reservoir (fenced)	119	0.2 miles
	3 Pit Reservoirs (unfenced)	26, 63, 147	None
	2 Dike Reservoir (fenced)	115, 117	0.5 miles
TOTAL	8		1.0 miles
Bare Pasture			
Water Developments	1 Spring	33	0.1 mile
	1 Reservoir	36	None
TOTAL	2		0.1 mile
TULEDAD ALLOTMENT GRAND TOTAL = 26.8 miles of fence			
BARE ALLOTMENT			
Hog Mountain Pasture			
Water Developments	2 Springs	61, 174	0.2 miles
	1 Reservoir	47	None
TOTAL	3		0.2 miles

the horses from seeking forage or moving to open spaces. New fences would present a particular hazard since horses would not be familiar with their location nor would the fences be easy to see even though the proposed action calls for colored posts. There would be a greater risk and frequency of injuries with new fences but as the horses become familar with the fences, the injury frequency would decrease. All fences located within wild horse areas create a hazard merely by their presence, but some would be more likely to cause injury than others because of their location near water, favorite feeding areas, and next to routes of travel. These would be the fences around springs, reservoirs, and meadows listed in TABLE 3-14. The Garden Lake project (#197) would have the greatest chance of causing injuries.

In the Tuledad Allotment approximately 19 miles of pasture fence (project #186) would be constructed in wild-horse areas to create a three-pasture system, two pastures of which (Cottonwood and Coppersmith) contain most of the wild horses. The wild horses in the Tuledad Allotment are divided into two groups. The Cottonwood pasture group, which also consists of a few horses in the south portion of the Coppersmith pasture, would be adversely impacted by the fence by having their movements restricted since their area of use consists of some portion of both pastures. Inventory data indicate a maximum of 18 horses (8 percent) of the total Cottonwood herd could have their freedom of movement restricted or could be confronted with an additional hazard since the fence would cross some horse trails. The critical portion of this fence (#186), between the Cottonwood and Coppersmith pastures, would be from Worland Ranch to Gerlach Spring on Cottonwood Mountain. The proposed action calls for gates on all horse trails. These gates would be open to allow horses to move freely except, when they are closed to control livestock (April to October). Since horse migrations occur chiefly in the winter months, open gates would alleviate adverse impacts imposed by fencing.

A similar situation would exist with respect to the Coppersmith Hills group of horses between the Bare Creek and Coppersmith pastures. Air and ground observations during the summer of 1976 revealed that approximately 15 to 20 percent of the Coppersmith Hills group of horses were in the Bare Creek pasture. It also appeared that they all moved to the southfacing slopes and open areas of the Coppersmith pasture for the winter months, with most of the movement occurring in the area of Mahogany Mountain. Gates would be placed on horse trails to allow the horses to move as freely as possible.

The population levels of horses in the Tuledad area are an important consideration in determining the degree of impact on them. The above discussion was based on a population level of 340 horses for the Tuledad Allotment. The area is now being managed for 100 horses and their total area of use may change. If the horses have enough space to roam freely and the fences were located in the fringe horse-use areas the possibility of injuries would be reduced. It is difficult to determine exactly how the horses will react to the managed population level of 100 head, but in any event the majority of horses in each group would not be affected to a great degree by pasture fence #186.

The three cattleguards proposed on pasture fence #186 between the Coppersmith and Cottonwood pastures are located in fringe horse-use areas. The proposed action calls for reinforcing bars to be welded between the rails to prevent a hoof or leg from getting caught in the cattleguard. This would make the possibility of injury minimal.

The horses of the Fox-Hog Mountain Herd Management area are located in the Hog Mountain pasture of the Bare Allotment, which has been under a systematic grazing system since 1976. Most of the range improvement facilities have been previously constructed. Additional facility development planned would result in minimal impacts. The fenced springs requiring 0.2 mile of fence and one reservoir that are proposed would not cause any restriction of movement; however there is a chance of injury to the horses because of the fences' presence near water.

SHORT-TERM AND LONG-TERM IMPACTS

The possibility of the fences causing injury would be present. However the frequency of injury would decrease as the horses would become more familar with fence locations.

Reseeding Tests

Two 40-acre reseeding tests are proposed in or near wildhorse areas in the Coppersmith pasture of Tuledad Allotment and the Hog Mountain pasture of the Bare Allotment.

The actual chaining and drilling of seed would cause some disturbance to the wild horses, but the activity would be for a very short period and would not cause a serious impact to the horses.

Visual Resources

Aesthetic values are regulated by form, line, color, and texture. Actions that produce a visible change in any of these elements of the natural environment can cause pleasant or adverse human reaction, depending on the attitudes and values of the individual.

Basic landscape elements that are present in the study area are: *Form*—the shape of the land surface, openings or changes in vegetative patterns or structures; *Line*—changes in vegetation, layering of soils and rock, drainage patterns, and ridge lines; *Color*—vegetation, soil and rock; and *Texture*—vegetation, rock outcrops, and erosion patterns.

Basic elements of landscape character can be affected in four ways:

(1) vegetation can be removed or changed;

(2) soil can be moved or rearranged;

(3) a structure can be placed on the landscape; and

(4) water may be introduced or removed.

The degree to which any of these takes place determines how great an effect the action has on the natural environment.

The Visual Resource Management (VRM) Class objectives, discussed in Chapter 2, and BLM's visual resource contrast rating procedures (APPENDIX J) were utilized to analyze impacts of the proposed action on visual resources. Refer to the GLOSSARY for definitions of specific terms.

Two of the five possible VRM Classes fall within the study area. The following specific management objectives can be used to assess the impact of an action by relating the modification of the landscape and resulting visual contrast rating to the basic elements of form, line, color, and texture: Class II—changes or modifications to any of the basic elements, caused by a management activity, should not be evident; Class IV—modification may subordinate the original landscape character and composition but must reflect what could be a natural occurrence within the characteristic landscape.

The VRM Classes were overlaid on a map showing allotment and pasture boundaries and proposed support actions to show the spatial relationships of potential impacts. Level of the impacts would depend on the VRM class rating of the area in which the action occurs. Refer to APPENDIX J for a more detailed discussion of the application of the visual contrast rating.

Determination of degree of contrast (strong, moderate, weak, none) is somewhat subjective. However, an attempt was made to show the potential visual contrast for each aspect of the proposed action. TABLE 3-15 indicates the potential contrast for each type of action. The greatest impact would be at the time of initial implementation with the impact gradually diminishing throughout the life of the project. Unless VRM objectives and standards are followed, there is potential for conflict.

Projects in the study area have not been individually rated as to contrast. Thus, potential contrast is discussed in the following paragraphs in general terms related to the VRM classes. Also, discussion of impacts as to initial implementation, first-year grazing cycle (short-term) and long-term (15 years), will be included within the analysis of each major component of the proposed action.

Systematic Grazing Management

Initially, the proposed action would cause contrasts between pastures as they are grazed, modifying the basic elements of line, color, and texture. A line would be created by the change in color and texture between adjacent pastures as the density, species composition, and amount of forage change through the grazing cycle. Pasture contrast would be most obvious directly along fences dividing pastures and between adjacent rest and use pastures, with the contrast most evident at the end of the grazing season.

As pastures are grazed during the season and throughout the grazing cycle, changes in color, brought about by increased plant density or changes in species composition, would have variable impacts depending on the location of the grazing unit in the overall landscape.

The level of utilization during each grazing season would also affect the degree of pasture contrast. In some of the more poorly vegetated areas, initial utilization could result in reduction in both plant size and density during early years of implementation. Where such conditions would occur, heavily cropped vegetation, exposed soil, and possibly accelerated soil movement would

TABLE 3-15

POTENTIAL CONTRAST FOR EACH TYPE OF PROPOSED ACTIVITY

	Land Surface				Vegetation				Structures			
TYPES OF ACTIVITY	Form	Line	Color	Texture	Form	Line	Color	Texture	Form	Line	Color	Texture
Systematic Grazing	-	-	-	-	-	XX	X	X	-	-	-	-
Custodial Grazing	-	-	-	-	-	XX	X	X	-	-	-	-
Grazing Exclusions	-	-	-	-	-	XX	X	X	-	-	-	-
Fences	-	X	X	-	XX	XX	X	X	XX	XX	XX	X
Cattleguards	-	X	X	-	X	X	X	X	XX	X	XX	X
Spring Developments	-	X	X	-	X	XX	XX	X	-	-	-	-
Reservoirs	XX	X	XX	X	X	XX	XX	X	-	-	-	-
Water Troughs	-	X	X	-	X	-	X	X	XX	X	XX	X
Wells and Windmills	-	X	X	-	X	-	X	X	XX	XX	XX	X
Pipelines	-	XX	X	-	-	XX	X	-	-	-	-	-
Livestock Trails	-	X	X	-	XX	XX	XX	XX	-	-	-	-
Reseeding Test	-	X	X	-	XX	XX	XX	X	-	-	-	-
Monitoring	-	-	-	-	-	XX	X	X	-	-	-	-

XX = Greatest Contrast X = Contrast - = Not Applicable provide greater contrasts between use and rest pastures. As the end of the initial 15-year period would be approached, contrasts might be lessened if vegetative conditions would equalize within pastures in each allotment.

In applying the visual contrast rating to the grazing system, the greatest contrast would possibly be in the line element of the vegetation features.

A total of 26 pastures are proposed for systematic grazing. Two of these (Selic-Alaska Canyon Allotment) would be entirely within Class II lands; a portion of the Bare Creek pasture of the Tuledad Allotment would also be in Class II. Adverse impacts would occur as a result of systematic grazing on these lands of high scenic value during initial implementation and the short-term period due to high visual contrast as to form and color but long-term impact would be expected to be beneficial.

Custodial Management

Range and degree of impact resulting from custodial grazing would be similar to those of systematic grazing with regard to modifications of the basic elements of line, color, and texture. As the use in each season and the amount of rest provided would be subject to the rancher's discretion, the extent of contrast between custodial allotments and adjacent areas could range from strong to minimal.

Grazing Exclusions

The exclusion of sites from grazing would in general provide beneficial impacts to visual aesthetic through improved vegetation and watershed conditions and the attraction of additional wildlife. The line contrast might be strong along fences separating exclosures and grazed pastures; however, differences in contrasts might be lessened as conditions improve or increase if the inverse were to occur.

Facilities to Implement the Proposal

FENCES

The major impact from fence construction would be the placement of an unnatural form and line in the landscape. The visual impact of the posts would be somewhat less and the impact of the wires would be minimal. Fences dividing grazing pastures would become the focal point of vegetative color and texture contrasts.

The lack of vertical elements in the natural landscape makes any man-made structure obvious; thus, fences skylined on ridgetops, constructed perpendicular to slopes or roads, or constructed in long, straightline segments would be readily visible in the landscape. On steep or high terrain, scars could be obvious for great distances.

Some fence construction would necessitate access where no roads or trails currently exist, creating a potential for unplanned roads and landscape deterioration.

In some areas, the color of the fence materials might not blend with the surrounding vegetation and soils. Gray-colored steel posts would not, in all areas, be in harmony with the natural environment. Segments constructed with highly visible colored posts would definitely conflict with surrounding landscape colors.

The greatest contrasts due to fence construction would possibly be in the form and line elements of vegetation features and the form, line and color elements of structural features. A total of 99 miles of pasture fence is proposed for construction, with an additional 32 miles at grazing exclosures. Eleven miles of exclosure fencing would be in Class II lands.

CATTLEGUARDS

Cattleguards would cause very localized ground and vegetation disturbance; however, as they would be readily visible to travellers, they might be considered a visual distraction to some persons.

The above-ground structure of a cattleguard is essentially the extension of a fence, thus contrasts to form, line, color, and texture would be similar to those for fencelines. A gate placed adjacent to a cattleguard could result in a cluttered appearance, which might be visually more displeasing than the fenceline itself.

The greatest contrasts due to cattleguards would possibly be to the form and color elements of structural features. Twelve cattleguards are proposed, none in Class II lands.

SPRING DEVELOPMENTS

Spring development would involve soil disturbance and the removal of vegetation, with very localized impacts. The addition of fencing to protect spring heads from livestock use would further modify the basic element of line. Fencing would provide a more pronounced modification of color and texture at the spring development by virtue of the vegetation that would become established within spring enclosures. Initially, impacts would be from the disturbance and later from the vegetative growth.

The greatest contrasts due to spring developments would possibly be to the line and color elements of vegetation features. Thirty-eight springs are proposed for development, five of these in Class II lands.

RESERVOIRS

Removal of vegetation, rearrangement of soil, and the addition of water would modify the basic landscape elements of form, line, color, and texture at reservoir sites. Excavation for reservoir construction would create an opening in the natural vegetative pattern; considerable soil movement might be necessary. Development of water bodies could increase aesthetic values by adding water in areas now lacking such features.

The visual impact of the seven fenced reservoirs would be greater than unfenced reservoirs due to the heavier vegetation that would become established within the exclosure. This would further modify the landscape by creating unnatural contrasts in form, line, color, and texture. Reseeding of disturbed areas with only one grass species would add considerably to this unnatural appearance.

Pit-type reservoirs would generally require less ground disturbance than the dike type; however, the difference in the aesthetic impacts of the two types is quite subjective.

The greatest contrasts due to reservoir development would possibly be in the form and color elements of land-surface features and in the line and color elements of vegetation features. Sixty-five reservoirs are proposed for construction, five of these in Class II lands.

WATER TROUGHS

Installation of water troughs would involve localized vegetation removal and soil disturbance and placement of a structure in the landscape. As a result, the basic elements of form, line, color, and texture would be modified. Changes would vary with the amount of vegetation removal and soil disturbance necessary to level the ground for the trough.

Landscape form would be altered by the addition of a structure, with variable impacts, according to configuration, location, and color. Since the spring source and the trough are normally connected by a pipe of variable length, the combination of these developments could considerably modify the natural landscape. The most obvious would be when the spring, a short pipe, and trough could be viewed from a single point.

The greatest contrasts due to water troughs would possibly be in the form and color elements of the structural features. Troughs are proposed for installation in association with spring, reservoir, and pipeline developments. Five troughs, at spring developments, are in Class II lands.

WELLS AND WINDMILLS

This construction would be one of the most localized of the development types with respect to surface and vegetation disturbance. Form, line, color, and texture of the landscape would be modified due to these structural features.

Windmills would be obvious in the landscape, due to the general low profile of the area; however, the aesthetic impact of a windmill is highly subjective, and could be pleasing to some, an intrusion to others.

The greatest contrasts due to wells and windmills would possibly be in the form, line, and color elements of the structural features. Thirteen wells and windmills are proposed, none in Class II lands.

PIPELINES

The installation of pipelines would involve some vegetation removal and soil disturbance. Depending to some extent on the width of the area from which vegetation would be removed, contrast in color would be created. Disturbance of surface color from cuts across areas of barren soil to bury pipelines could create a line that might be evident for years, since that color is probably the result of years of weathering and chemical action.

The "ripper tooth" method of installation would cause a minimal impact on vegetation and soil as it would not be necessary to blade a road; the tracks from the machine would cause the greatest impact.

Because of the need to locate pipelines to obtain gravity flow from the water source to the storage trough, there is little opportunity to design these developments consistent with natural lines.

The greatest contrasts due to pipeline construction would possibly be to the line elements of land surface and vegetation features. Fourteen miles of pipeline, in four separate segments, are proposed, none in Class II lands.

LIVESTOCK TRAILS

Livestock trails would require a 3-foot right-of-way, with vegetation removed and soil disturbed over the entire length of the trail.

Trails would place a line, provide a color contrast, and might change the texture if cuts or fills are required.

Where the land surface would be altered, trails might cut through soils or rock formations of unique coloration, leaving a lasting scar, since this coloration has resulted from years of weathering and chemical action.

Development of trails would destroy the natural vegetation. Reseeding with only one species would provide an unnatural vegetative pattern in the area, continuing the line and color impacts over the long term.

Use of trails by ORV recreationists could disrupt the landscape by opening up the trails to erosion potential.

The greatest contrasts due to livestock trails would possibly be to the form, line, color, and texture elements of the vegetation features. Four trails, totaling four miles in length, are proposed, none in Class II lands.

Reseeding Tests

The proposed treatments would modify the basic elements of form, line, color, and texture from the initiation of the action through the period when the seeded vegetation would grow or native vegetation would become reestablished. However, due to the small acreage involved, impacts would be relatively minor.

Vegetative manipulation by chaining could adversely affect soil by disturbing the surface and removing vegetative cover. Debris left by chaining could be aesthetically displeasing, as it would remain in the area for years. Manipulation of vegetation might cause changes that could be seen for great distances, due to the low relief and lack of high vegetation.

Boundaries of each treatment project would form a line where they contrast with the surrounding vegetation. Texture change would result from the contrast between the treated area and the surrounding vegetation. The projects would modify form by creating openings in the natural vegetative pattern. The color of the treated area would be in sharp contrast to adjacent vegetation, especially in heavy sagebrush stands.

The greatest contrasts due to reseedings would possibly be in the form, line, and color elements of vegetation features. A total of 160 acres in four areas are proposed for reseeding. None of these areas are in Class II lands.

CULTURAL RESOURCES

Impacts upon archaeological and historical sites consist of changes from their original condition. Since the information content of these sites resides largely in their physical structure, any structural change constitutes a stage in the erosion of the total information base. Moreover, such changes are permanent and nonreversible. In this light, all changes must be considered adverse impacts as no change in physical structure will benefit or "improve" cultural sites, although some programs of research, including excavation, may make their information content more accessible. The only beneficial impacts relating to cultural resources are those which reduce the intensity of factors promoting change.

Implementation of the proposed action would result in direct impacts upon cultural resources deriving from both the physical presence of cattle and the facilities proposed to make the system operative. The intensity of impacts upon any given site, however, would be a function not only of the site-specific particulars of the proposed action, but also of the nature of the site and of its environmental setting. Certain upland sites, especially many hunting stations and lithic sources, occurring high on nearly unvegetated rubble uplands remote from water, would never receive the intensity of cattle use (or project-related impacts) as would spring-based camps and villages.

An indirect beneficial impact of the proposed action affects not the resource base itself but the quality of our information regarding it. The 1976 survey (a technical report of which is being prepared for separate publication) has already generated an enormous body of data relevant to an understanding of the prehistoric human geography of the area, as well as identifying several important problems for future reasearch. Implementation of the proposed action would require additional archaeological survey pursuant to proposed mitigation measures and would result in a further substantive contribution to knowledge of the region's prehistory.

General impacts of livestock grazing and construction are treated first; then, specific impacts of the five components of the proposed action are addressed.

Impacts of Livestock Grazing

While it is relatively easy to identify categories of livestock-related impacts, and to find examples where they have effected changes in the physical structure of sites, there is no body of data currently available which adequately quantifies the intensity of impact (in terms of animal numbers) in a universally applicable formula which defines the rate at which resulting changes occur. Such data can be generated only by long-term monitoring programs designed specifically to address the problem. While several such programs have been initiated (including one within the study area, described in Chapter 4), they are all in stages too early to have delivered useful returns.

In a preliminary replicative experiment designed to test some immediate impacts of livestock presence on archaeological sites, Roney (1977) analyzed a brief impact episode in which data on animal numbers, land area, soil conditions, and nature and condition of archaeological materials were carefully controlled. While the results of analysis have very limited specific applicability to a broad spectrum of environmental settings, they are sufficient to demonstrate (as discussed below) that livestock impacts are real and measurable and, under certain circumstances, may be severe.

(1) *Breakage of surface artifacts through trampling.* Lithic artifacts (both tools and debitage) are easily fractured; in walking upon a flat surface, an adult cow's hooves may exert a pressure of about 25 pounds per square inch, sufficient (especially where unresistant soils provide no cushioning effect) to fragment even large implements of obsidian. Moveover, the easily altered sharp edges of chipped stone butchering, cutting, and scraping tools generally exhibit wear patterns critical to interpreting their function correctly; where these use-affected edges are exposed to even moderate pressure, resulting fractures can obliterate significant data.

Roney (1977) found that in an impact situation equivalent to 12 years of continuous grazing at a density of one cow per 20 acres, 48 percent of a sample of premeasured artifacts suffered some degree of physical damage. Roney's experiment was limited to a zone of very soft sandy loam, and therefore probably approximated a setting of minimum artifact damage; unquestionably, a harder, rockier surface would result in a greater incidence of damage. Further, Roney points out that the experiment does not simulate the uneven distribution of cattle on open range.

(2) *Lateral displacement of surface artifacts.* The spatial distribution of discrete elements in a horizontal scatter of cultural materials is often the only key available for the reconstruction of prehistoric activity patterning. Archaeologists have in recent years developed analytical techniques for extracting and interpreting these subtle data (Whallon, 1974), but such techniques require that surface arrays be relatively unchanged from their original distribution or, at least, that reliable displacement coefficients can be applied.

Roney's experiment demonstrated that under the intensity of livestock activity tested by his experiment, 38 percent of the premapped specimens exhibited detectable displacement factors averaging between .75 and 1.6 meters, sufficient to obscure small-scale distribution patterns. The cumulative effects of repeated cattle passage over fragile pattern surface sites and the concentration of cattle on sites adjacent to water sources could result eventually, especially where such sites are not buffered by a protective mat of vegetation, in some displacement of all surface artifacts.

(3) *Disturbance of vertical deposits.* To the extent that cattle trampling loosens surface soil and may accelerate erosion, the subsurface components of sites with vertical deposits would be altered. Vertical context is a principal element of the information content of deep sites and is often the only key to their chronology. Moreover, the mixing of vertical deposits would result in loss of information on the spatial structuring of prehistoric activities, as well as data necessary for the reconstruction of paleoecological relationships and cultural evolution.

Impacts of Construction

All categories of construction required by facilities to implement the proposal could have some destructive effect on cultural resources. The impacts of construction would be a function of the degree of surface and subsurface disturbance and of the nature of the site receiving impacts.

(1) *Spring Developments.* Springs are particularly important in the archaeology of arid lands, providing the foci for all categories of occupation sites. Such sites tend to be large, complex, and

often deep. Their information content is critical to the development of regional chronologies, the working out of prehistoric ecological relationships, and the analysis of culture change.

Since the design of the proposed developments includes a fence to exclude livestock from the spring area, and from archaeologically sensitive zones (Chapter 1), the impact of trampling by increased concentrations of cattle would be effectively eliminated.

More severe would be the impacts of actual construction. While cultural deposits seldom occur immediately at the springhead, the removal of 48 cubic feet of soil by backhoe excavation could in some instances destroy significant cultural contexts. Excavation for the burial of multiple perforated pipes (as proposed for seeps) would compound the impacts. The placement of pipelines and a watering trough could result in surface disturbance. Fenceline construction within site precincts, particularly if machinery is employed, could seriously disturb both surface and subsurface materials.

(2) *Reservoirs*. Reservoir sites seldom occur at natural water sources and therefore, as a category, are less culturally sensitive than spring sites. Where their locations correspond with cultural resources, however, their impacts could be severe.

The impacts of both retention dams and pit reservoirs would be substantially the same; movement of fill or excavation of a pit would mix deposits and destroy cultural contexts if it were to occur within a site's boundary. The intensity of such impacts would be a function of the size of the specific development and the size and nature of the cultural site affected.

(3) *Pipelines*. Mechanized excavation of a 9- to 30-inch-deep trench for several miles of pipeline could transect large sites and disturb a portion of their surface and subsurface contents and, in the case of some very small, fragile sites, could obliterate them entirely.

Water troughs along the pipeline would provide a focus of livestock concentration, thereby increasing livestock-related impacts on cultural resources at trough sites.

(4) *Fences*. Fencelines would have the same transecting effect as pipelines, but would involve much less severe subsurface disturbance. Principal impacts would be incurred during actual construction, chiefly as a result of the movement of heavy equipment. Surface distributions would be altered and breakage would be likely. A secondary impact would result from the tendency of cattle to concentrate their traffic along fencelines. Where fences crossed cultural sites, the intensity of trampling impacts would be magnified.

(5) *Livestock Trails*. Construction of 4 miles of livestock trails would result in the removal of cultural materials wherever sites were transected. Material deposited at the sides of the trail would further contribute to a mixing of cultural contexts, an impact which would be compounded by water barring.

(6) *Wells, Windmills, and Cattleguards*. Each of these project categories would adversely impact cultural resources if executed within site boundaries. While the volumetric disturbance of each would be small, and could obliterate entirely only the smallest sites, impacts could be severe, especially where deep, old, small, or unique sites were affected. Watering troughs at well sites would concentrate cattle, accelerating impacts from trampling.

Specific Impacts of the Proposed Action

The five components of the proposed action would have different kinds and degrees of impact on cultural resources and, in certain instances, would produce impacts which can be expected to change over time. Each circumstance is discussed below.

SYSTEMATIC GRAZING MANAGEMENT

Short Term (First Grazing Cycles)

Cultural resources in each of the eight grazing allotments for which AMPs are proposed would receive varying degrees of the livestock-related impacts (breakage, lateral displacement, trampling-induced erosion) discussed in the treatment of general impacts, above.

Although the intensity of impacts from diffuse livestock trampling would be highly variable, all categories of open site within the proposed grazing allotments could potentially receive some measure of impact. Open sites (see GLOSSARY) constitute 93.24 percent of the total inventory of known sites; accordingly, a predicted 7,529 sites would lie within the zone of potential impacts from trampling, arrayed in the following allotment distributions (based on the probabilistic sampling discussed in APPENDIX H):

Denio—311
Wall Canyon—500
Bare—2,588

Lower Lake—126
Duck Lake—748
Home Camp—1,931
Selic/Alaska—60
Tuledad—1,265

Further, 138 known archaeological sites, including 10 properties eligible for nomination to the *National Register of Historic Places*, occur at locations where livestock concentrate; they would continue to receive more intense trampling than would the majority of sites. TABLE 3-16 summarizes the site types, *National Register* potential, and allotment distributions of sites which would be so impacted.

Long Term (15 Years and Beyond)

Since cultural resources cannot be improved, made more abundant, or invested with an information content greater than they already possess, they can be benefitted only by actions which reduce destructive forces already in operation or which prevent the inception of others.

In the Tuledad/Home Camp Study Area, erosion is the force currently most destructive of cultural sites, contributing to the spatial displacement of artifacts and the loss of cultural contexts. Geologic erosion has been significantly accelerated by the depletion of vegetative cover resulting from severe overgrazing and could be effectively retarded only by the restoration of a stabilizing vegetative cover. Since the objective and the predicted outcome of the livestock grazing program is the establishment and maintenance of a trend toward habitat-type potential in natural vegetation communities, the long-term effect of the action would be beneficial to cultural resources. All categories of open site (see GLOSSARY) would benefit, though the degree of benefit would in each case be a function of the present intensity of erosion and the rapidity with which vegetative cover actually responded to treatment.

CUSTODIAL MANAGEMENT

Custodial management implies that BLM will not regulate stocking numbers or periods of use except for the Red Rock Allotment. For these areas, previously discussed impacts of livestock grazing would occur and beneficial impacts of trends toward habitat-type potential would not occur. Throughout the life of the project, cumulative impacts would continue to accrue to a predicted 53 cultural sites, arrayed in the following distributions (based upon the probabilistic sampling discussed in APPENDIX H):

Corral—23
Highway—15
Cold Spring Mountain—2
Cedar—2
Boot Lake—2
State Line—1
Clarks' Valley—0
Red Rock—8

Neither beneficial impacts nor long-term reductions in impact would be projected for custodial management areas.

GRAZING EXCLUSIONS

Cultural resources on the 18,920 acres proposed for grazing exclusion would suffer no adverse impacts as a result of the proposed action. By removing the agents of trampling, the proposed action would constitute a significant improvement over the present situation. The chief areas to be benefitted would consist of the old Bicondoa Allotment, with a predicted 90 sites, and the western portion of the Lower Lake Allotment, with a predicted 38 sites. Benefits would accumulate over time as the response of vegetation increasingly buffered the effects of erosion.

FACILITIES TO IMPLEMENT PROPOSAL

Short-Term Impacts (Construction Phase)

Since impacts on cultural resources, once affected, are irreversible, construction-related impacts constitute an irretrievable commitment of the resource base. Analysis of impacts, therefore, rests upon the close reconnaissance of specific project areas.

Where proposed projects are small in areal extent and have been located precisely on the ground, the quantity and intensity of their impacts can be addressed specifically. Where their locations are known so far only as mapped approximations (fences, pipelines, livestock trails), quantification of their impacts must await ground survey and preconstuction archaeological reconnaissance.

SPRING DEVELOPMENTS

All proposed spring developments have been surveyed for cultural resources. Six are associated with archaeological sites (chiefly base camps and temporary camps) which could be adversely impacted by development. TABLE 3-16 identified sites by category, *National Register* potential, and allotment distribution, which would be impacted by proposed development.

TABLE 3-16
KNOWN CULTURAL RESOURCES WHICH WOULD BE IMPACTED BY GRAZING AND WATER DEVELOPMENTS 1/

Impacts by Allotment	Villages	Base Camps	Temp. Camps	Lithic Scatters	Quarries	Hunting Stations	Rock Shelter	NRHP 2/
Denio								
Trampling 3/			4	2	2		1	1
Wall Canyon								
Trampling			2	3	4			
Bare								
Trampling			10/2 4/	10	4			2
Water Development 5/			(#61) 1	(#73) 1				
Lower Lake								
Trampling		4/4 6/		5				1 (District)
Duck Lake								
Trampling	1 7/	5	2	6	1			1 (District)
Home Camp								
Trampling		2	7	4	1			1
Water Development			(#90,179)2					
Tuledad								
Trampling	4	8	17	25	5	1		5 (Incl. 2 Dists.)
Water Development		(#12,37) 2	(#35) 1	(#115) 1				

1/ Includes only those areas which have been surveyed. Sites on private land are shown in brackets.
2/ Sites or districts eligible for nomination to the National Register of Historic Places.
3/ Sites which would be impacted by intense cattle trampling during first grazing cycle.
4/ Ten sites on public lands, two on private lands.
5/ Sites which would be directly impacted by spring/reservoir projects. Parenthetic numbers indicate specific water developments.
6/ Four sites on public lands and four on private lands.
7/ On private lands.

RESERVOIRS

All proposed reservoir sites have been surveyed for cultural resources. Two archaeological sites were recorded within the impact zones of proposed reservoirs. These site categories, their *National Register* potential, and their allotment distributions are summarized in TABLE 2-41.

LINEAR PROJECTS

Until specific, on-the-ground locations of proposed fencelines, livestock trails, and pipelines have been established, it will not be possible to quantify the predicted impacts of each. Even minor deflections in course could determine whether sites were severely impacted or free from impacts; linear projects might transect zones of high site density yet by-pass all sites or, equally, might intersect a majority of even sparsely distributed ones.

WELLS, WINDMILLS, AND CATTLEGUARDS

Each of these potentially impacting project categories must await ground survey to assess adequately its cultural resource impacts.

Indirect Impacts of Construction

Because many of the proposed developments are remote and not accessible from existing roads, construction and maintenance equipment would have to be brought cross country. Heavy equipment transport transecting cultural sites would result in horizontal displacement and breakage of cultural materials and might also produce shallow subsurface disturbance.

Long-Term Impacts

A secondary effect of provisional access to projects is the tendency of temporary roads to become permanent. If equipment access corridors were left visible (disturbed soil, crushed vegetation, tire tracks) there is a strong likelihood that they would be used subsequently by recreationists. The effect would be to make accessible to potential vandals cultural sites whose inaccessibility has so far been their chief protection. These impacts could extend to site categories (such as caves, rock shelters, and petroglyphs) which otherwise would not be impacted by the proposed action.

RESEEDING TESTS

Because the proposed action specifies an archaeological survey prior to selection of reseeding plots, and avoidance of cultural resources, no cultural resource impacts would occur.

RECREATION RESOURCES

Most recreation opportunities in the study area are associated with scenery, wildlife populations, and collection of gemstones and petrified wood. Site-specific impacts associated with concentrated recreation activities thus would be limited.

TABLE 3-17 shows the estimated recreation activity occasions in the study area for 1991, with the implementation of the proposed action, and compares the 1991 data with 1976 data.

Participation increases are based, in part, on the trends of population growth, increased popularity in some recreation activities, and additional leisure time. Throughout the 15-year period, improvements in vegetation and watershed conditions could contribute to increased recreation opportunities through change in wildlife habitat.

TABLE 3-18 shows the estimated hunting activity occasions for 1991 by allotment and compares these data with 1976 figures.

In spite of these anticipated increases, many recreation uses would be impacted by the proposed action. Impacts could be both positive and negative, short term or long term, depending on the views of the recreationists.

Systematic Grazing Management

The landscape would be modified by systematic grazing management. Thus, many of the impacts on visual quality would also be impacts on sightseeing.

A beneficial impact would be better control of livestock distribution, thus preventing concentrations in scenic areas and lessening conflicts between recreationists and grazing animals. However, livestock use and movement of animals would likely be incompatible with concentrations of recreation use, such as ORV activity, camping, etc.

Concentrations of livestock in recreation use areas would result in undesirable animal odors and defecations. Absence of cattle in rest pastures would result in less physical disturbance to recreation users and the elimination of odors and health hazards.

Rest pastures would be a fire hazard due to anticipated vegetative growth, presenting both a safety hazard and a decrease in sightseeing values after a burn.

Increased vegetation would somewhat disrupt the activity of rockhounders if less rock or soil surface were visible.

TABLE 3-17

ESTIMATES OF 1991 OUTDOOR RECREATION ACTIVITY OCCASIONS IN THE STUDY AREA WITH THE PROPOSED ACTION, AND COMPARED WITH 1976

Activity	Activity Occasions 1976[1]	Activity Occasions 1991[2]	Percent Increase
Camping	1,800	2,900	61
Fishing	600	900	50
Hiking	1,600	2,600	62
Hunting	7,500	11,800	57
ORV	2,300	3,500	52
Picnicking	1,100	1,700	54
Rockhounding	7,400	11,900	61
Sightseeing	10,000	15,900	59
Other Activities	1,700	2,600	53
TOTALS	34,000	53,800	58

[1] From TABLE 2-42, Chapter 2, Recreation Resources.

[2] Calculation from data in the draft Nevada SCORP, 1976.

TABLE 3-18
ESTIMATES OF 1991 HUNTING ACTIVITY OCCASIONS WITH THE PROPOSED ACTION, COMPARED WITH 1976, BY ALLOTMENT

	Hunting Activity Occasions		
Allotment	1976	1991[1/]	Percent Increase
Bare	2,000	3,200	60
Denio	200	400	100
Duck Lake	600	1,000	67
Home Camp	1,600	2,600	62
Lower Lake	200	300	50
Selic-Alaska Canyon	100	160	60
Tuledad	2,000	3,000	50
Wall Canyon	600	1,100	83
TOTALS	7,300	11,760	61

[1/] Calculated by using estimated increases in big game numbers, as shown in Wildlife, TABLE 3-9, with actual increases in game dependent on the allocation of additional forage to wildlife.

Livestock trailing could be hazardous due to the presence of animals on roads normally traversed by recreationists.

Over the long term, wildlife habitat would improve, increasing wildlife populations and resulting in better quality hunting opportunities. An increase in harvest, however, would be subject to factors not directly controlled by BLM, such as designation of seasons and limits by the State Departments of Fish and Game. Thus, increased game numbers may or may not result in increased hunting. Movement of livestock during hunting seasons would cause conflicts with hunters.

Increased wildlife populations would improve opportunities for observation and nature study. Wildlife and wild horses might concentrate more in rest pastures, resulting in improved opportunities for observation.

The presence of livestock in some areas would conflict with recreationists seeking solitude, or a primitive/wilderness-type experience.

Watershed and water-quality conditions would improve on portions of some streams, increasing fish populations (either naturally or by permitting more successful stocking), thus improving fishing opportunities.

Custodial Management

Concentrations of livestock in areas used by recreationists could result in undesirable conditions due to animal odors and defecations. Livestock use is likely to be incompatible with recreation uses such as hunting, ORV activity, etc.

Grazing Exclusions

Exclusion of livestock would eliminate conflicts between recreationists and grazing animals and would eliminate the problems associated with odors and health hazards.

Improved wildlife habitat and increased wildlife populations in these areas could result in better quality hunting opportunities. Because these increased wildlife populations might concentrate in exclosures, opportunities for observation and nature study would be improved.

Increased vegetative growth would somewhat hamper future activities of rockhounds, as less rock or soil surface would be visible. Use of ORVs might also be somewhat hampered by increased vegetative growth.

Watershed and water-quality conditions would improve, thus increasing fish populations and fishing opportunities.

Facilities To Implement the Proposal

Proposed projects such as spring developments, reservoirs, etc., would disturb or destroy wildlife habitat by removal of vegetation, thus causing a decrease or relocation of wildlife populations until sites are rehabilitated. This would have a short-term adverse impact on recreational opportunities associated with wildlife.

Water developments that contain sufficient capacity would act as a focal point to attract wildlife, thereby increasing viewing opportunities as well as providing desirable habitat for waterfowl production. Some new water developments could be stocked with fish for recreational purposes.

Removal of vegetation and soil disturbance associated with proposed projects could improve conditions for collecting gemstones and petrified wood by further exposing them to rockhounds. This short-term benefit might be partially offset over the long term as vegetative cover increased through rehabilitation, making the ground or rock surface less visible. However, with project construction involving surface disturbance, the potential would exist for destroying known or unknown deposits of petrified wood.

Project developments might intrude on the natural setting of geologic features. Placement of structures near such features would tend to detract from their value for viewing and interpretive purposes. Potential damage during development of projects occur.

Development of project roads could be beneficial to some recreationists by making remote areas more accessible. Off-road-vehicle use might increase somewhat in early years of project implementation as roads and areas of surface disturbance would be attractive to ORV users. Better hunter harvests could also occur as a result of increased access. However, these same roads could lead to additional vandalism, illegal removal of petrified wood, and increased poaching.

Development of projects such as fences would have the adverse impact of disrupting the natural movement of recreationists, lessening the impression of wide, open spaces.

Fences would provide a negative impact by obstructing hunter movement. They would also be a barrier to cross-country travel for horseback riding, hiking and ORV use. Fences across trails or areas previously utilized by ORVs would present hazards if not properly marked or identified for easy observation.

Reseeding Tests

Chaining and reseeding could provide a short-term disruption to sightseeing opportunities due to surface disturbance and loss of vegetation. However, as none of the proposed reseeding plots would be within view of major sightseeing routes, impacts on sightseeing would be minimal.

Soil disturbance and removal of vegetation would increase rockhounding opportunities immediately after chaining; however, increased vegetative growth in the future could somewhat hamper rockhounding activity. With surface disturbance, the potential exists of destroying known or unknown deposits of petrified wood.

WILDERNESS RESOURCES

Systematic Grazing Management

Grazing management as proposed could improve livestock distribution, vegetative and watershed conditions, thus resources that can be directly related to wilderness values, such as the natural landscape and wildlife populations, might show some improvement.

Custodial Management

The custodial grazing allotments do not have potential for wilderness designation.

Grazing Exclusions

Several areas to be excluded from grazing fall within potential wilderness study areas. Improvements in vegetation and watershed and wildlife values within the exclosures could provide a beneficial impact to wilderness values.

Facilities to Implement the Proposal

Types of facilities that would be most incompatible with wilderness values are livestock trails, windmills, fences, cattleguards, water troughs, and reservoirs. Many project locations would be on the fringes of potential wilderness study areas and might present no real conflict. Other proposed developments would bisect or lie in the center of areas that might qualify as wilderness study areas.

LAND USES

Livestock Grazing

SYSTEMATIC GRAZING MANAGEMENT

Livestock performance while on public lands would be directly related to the density and quality of desirable forage. In the short term, livestock grazing in the pastures receiving Treatments A and B would have to utilize less palatable species in lower nutritious states. Increased forage availability and improved forage quality would result in improved nutrition essential to reproduction, lactation, growth, and fattening processes. Percent calf crop would be expected to increase from an average of 83.5 percent to 85 percent; calf weaning weights would increase from an average of 332 pounds per head to 356 pounds per head; cull cow weights would increase from an average 913 pounds per head to 951 pounds per head; and percent lamb crop would increase from an average of 110 percent to 112 percent (TABLE 3-19). Conception rates would increase, however, they would eventually stabilize. The proposed action would not be expected to affect the death loss rate in either the short or long terms.

Grazing of familiar areas in a different sequence would be expected to disorient livestock for at least one cycle but not more than two. This disorientation, plus forced driving of livestock to acclimate them to a new grazing routine would initially produce lighter weaning and cull weights.

Sheep performance may decrease. Additional trailing or trucking of livestock to and confining them to smaller areas would increase competition and would adversely affect sheep performance. Springfield (1963) stated that stocking rates appeared to affect sheep grazing habits. In a study using different sized paddocks he noted that sheep in lightly stocked paddocks (2.2 sheep-months/acre) obtained their fill earlier than those in more heavily stocked paddocks (5.8 sheep-months/acre). He also noted sheep travelled less, rested more, and appeared more frequently at water in the larger paddocks. The sheep operators in the study area anticipate lamb weaning weights would decrease from an average of 95 pounds per head to 85 pounds per head. The operators do not anticipate an increase in cull ewe weights. These impacts would be somewhat alleviated through the anticipated increase in percent lamb crop and available forage.

The grazing system proposed for the Tuledad Allotment would also have adverse impacts on cattle operators. These impacts would be primarily related to changes in existing animal husbandry practices. Different herds of cattle would be restricted to smaller pastures which would result in crossbreeding by bulls of different breed and/or quality; transmission of diseases between herds which have not had contact before; and an in-

TABLE 3-19
ESTIMATED LIVESTOCK PRODUCTION IN 15 YEARS

	EXISTING SITUATION						WITH PROPOSED ACTION					
Allotment	% Crop	Weights (lbs)	Death Loss (%)	Herd Size	Cull Weights (lbs)	Cull Re-placement (%)	% Crop	Weights (lbs)	Death Loss (%)	Herd Size	Cull Weights (lbs)	Cull Re-placement (%)
Denio (Cattle - yearlings)		700	5	272	-	-		725	5	269	-	-
Wall Canyon (Cattle)	83	353	2	527	996	10%	87	373	2	553	1,025	10%
Bare (Cattle)	95	400	1	2,138	965	9%	95	425	1	2,766	970	9%
Lower Lake (Cattle)	70	250	1	140	875	10%	70	275	1	104	950	10%
Duck Lake (Cattle)	85	300	6	459	750	20%	90	325	6	378	800	20%
Home Camp (Cattle)	85	300	6	1,789	933	20%	85	325	6	1,506	1,000	20%
Selic-Alaska Canyon (Sheep)	110	95	3	1,000	135	25%	112	93	3	1,290	135	25%
Tuledad (Sheep)	110	95	3	4,000	135	25%	112	87	3	4,439	135	25%
(Cattle)	83	388	8	988	960	17%	83	413	7	1,096	961	17%

crease in the incidence of foothills abortion due to concentrations of cattle in pastures which may contain localized populations of ticks. Stevenson, et al., would be expected to be most adversely affected. Customarily they remove approximately two-thirds of their cattle from the Tuledad Allotment and take them to the Modoc National Forest around July 1. However, conducting a gathering of this proportion in smaller pastures could result in a great disturbance of other livestock in the allotment. Therefore, by their own choice they would reduce their cattle numbers in the Tuledad Allotment by approximately one-third and run season long without gathering to go to the forest. This would place a burden on them to provide forage for those cattle not on public lands until it is time to go to the forest and also to obtain additional cattle to fill their forest permit. The cumulative effect would be the requirement to provide additional forage for approximately 300 head they have customarily had on public lands and also for approximately 300 additional head needed to fill their forest permit. In total, they would have to furnish approximately 5,540 AUMs of additional forage on their base lands. Since the operators do not feel they have the capacity on their base lands to provide this forage, they would consider disposing of either the BLM grazing privileges or the national forest permit. This impact could be lessened considerably in the long term if livestock forage increases in the Tuledad Allotment would be realized and an increase in livestock use were granted.

An adverse action which might accrue to the livestock operators in the Selic-Alaska Canyon Allotment would be the possible concellation of livestock grazing after six years. This action would depend on the vegetation response to the proposed action; therefore, it is now not known if the action would be necessary.

An additional adverse impact would be the cancellation of livestock grazing on the Bicondoa Allotment. Although the allotment has had total nonuse since 1974, the decision would have an adverse effect on the livestock operator and would also place a burden on the base property to provide forage from December 1 to January 25 if the operator wishes to reinstate his grazing use.

The seasons of use specified in Chapter 1 would have significant impacts on total forage production and the usability of forage produced. Some habitat types would improve one condition class. This is expected to result in increased livestock grazing use. However, potential use of this forage is limited by MFP decision and system management.

In the Treatment A pasture, the early turnout dates (March 15 to April 15) would result in a decrease of up to 12 percent in available livestock forage (Hormay and Talbot, 1961). Hormay and Talbot, through grazing and clipping trials, indicate grazing use prior to low boot stage (when flowering parts are in an early stage of development) can suppress vegetative growth as much as 12 percent for a five-month season. The approximate date when flower stalks are low in boot in the study area is May 15 for Idaho fescue and bluebunch wheatgrass.

With specified seasons of use, livestock would spend most of the grazing season in the first pasture and a short period of time in the second pasture. This would result in a high degree of nonutilization of available livestock forage in the second pasture. Anticipated livestock use after one cycle and in 15 years is shown on TABLE 3-20.

CUSTODIAL MANAGEMENT

There would be no measurable impacts in the custodial management allotment.

FACILITIES TO IMPLEMENT THE PROPOSAL

Improved livestock performance (sheep and cattle) could be expected by reduced trailing resulting from increased availability of livestock water. Harris (1972) states that, since livestock expend considerable energy, the distance traveled to obtain feed and water is relevant when calculating energy needs. As a result of the shorter distances from water to feed, the livestock would be more efficient in converting forage to reproduction, lactation, growth, and fattening processes rather than to energy for trailing. Additional water sources combined with smaller areas would result in better livestock distribution and improved utilization of forage.

Additional pasture and exclosure fences would contribute to disorientation.

RESEEDING TESTS

Additional livestock forage might be derived from the reseeding rest plots; however, until success of the seedings are determined, the amount can not be quantified.

TABLE 3-20
LIVESTOCK USE BY ALLOTMENT 1/

Allotment	Current Authorized Livestock Use 2/	Percent Usable 3/	Anticipated Livestock Use After One Cycle (AUMS)	Anticipated Available Forage 4/ After 15 Years (AUMS)	Percent Usable 3/	Anticipated Livestock Use in 15 Years (AUMS)
Denio	1,633	86	1,399	2,188	86	1,882
Wall Canyon	2,634	71	1,881	3,898	71	2,768
Bare	14,968	88	13,097	22,003	88	19,363
Lower Lake	698	56	388	928	56	520
Duck Lake	3,611	56	2,031	5,308	56	2,972
Home Camp	9,761	69	6,715	11,908	69	8,217
Selic Alaska Canyon	1,239	100	1,239	1,598	100	1,598
Tuledad	10,947	76	8,356	15,983	76	12,147
TOTALS	45,491		35,106	63,814		49,467

1/ Methodologies are included in APPENDIX K.

2/ AUM figures are estimates. Forage production may vary as much as 200-300 percent (Chapter 3, Vegetation).

3/ Only a portion of the available AUMs can be used within specified seasons of use.

4/ Based on 1965 SCS Range Site Descriptions.

Agriculture

Impacts on livestock operators' base property production would vary. Where sufficient forage would be produced to allow livestock operators to increase herd size, demands would be placed on base properties to produce additional forage for the time livestock are kept on base lands.

Where forage production on allotments would not be sufficient to maintain existing livestock use, increased demands would be placed on base properties. Forage on base ranches being produced in excess of current livestock demands might be fed to livestock to maintain existing herd sizes. Base ranches without the capability to provide additional forage would reduce herd size. Land currently used for hay production might be used to pasture livestock during the spring and summer.

Base properties for public lands proposed for custodial management would not be affected.

SOCIO-ECONOMIC CONDITIONS

Economic Conditions

POPULATION

Implementation of the proposed action would not have a discernible influence on population trends, either from a study-area standpoint or when dealing with just the Systematic Grazing Management area. Individual operators might employ additional ranch hands, and Federal agencies (SCS, BLM) might hire additional employees for monitoring, but these increases would be minor.

EMPLOYMENT

Employment increases which would probably result from implementation of the proposal are expected in three sectors: (1) in agricultural labor, since there would be an anticipated increase in demand for ranch workers to maintain range improvements and to handle livestock; (2) in the generation of additional workloads within the BLM and SCS for monitoring and supervision of the grazing plans; and (3) in the construction sector, since contracts would be let for most range facilities aside from the development of springs (which would be developed by the BLM District Office).

Seasonal help might be required in each allotment to move cattle from pasture to pasture and to make necessary repairs to facilities. If each allotment were to require an additional two ranch hands for the period of June 1 through November 30, the proposal would generate about 96 manmonths (MM) of additional ranch labor per year. Wages for ranch employees for 1974 averaged $472/month (Nev. Crop and Livestock Reporting Service, 1974, p. 19). By comparison, there were an estimated 1,850 unemployed individuals in the region in 1975 (TABLE 2-45, Socio-Economics).

After full implementation of the proposed action, it is estimated that two seasonal BLM employees would be required for three months each (or six MM/year) to carry out condition and trend studies. Other permanent employees in the BLM District Office would handle any other work accruing from implementation of the proposal. The SCS might hire two full-time specialists (totaling 22 MM/year) to work with BLM in monitoring the impacts of rest-rotation grazing systems on the region's soil-water properties.

The construction sector would probably be stimulated more than either of the above-mentioned employment categories. During construction (a two-year schedule), 115 manmonths of labor would be required to construct the proposed facilities. Of these developments, 29 percent of the manmonths would be spent in fence construction; 28 percent in reservoir construction; and 33 percent in spring development. Calculations for manmouths were derived by multiplying numbers of projects by the following assumed labor requirements to complete a typical project: 1 MM/spring; .25 MM/mile of fence; .1 MM/cattleguard; .5 MM/reservoir; .1 MM/mile of stock trail; .2 MM/mile of pipeline; 1 man-day/35 acres for chaining and 1 man-day/70 acres for seeding; and .1 MM/pipelines and troughs.

As construction of all range facilities on Federal lands except spring developments would be contracted out, there would be little chance that additional jobs would be created for local labor forces, i.e., people within the region have not (in the past) bid for such construction contracts, and would not be expected to do so in the future, since contractors normally bring their own labor forces. Therefore, implementation of the grazing plans would have little, if any, influence on reducing current levels of unemployment within the region.

INCOME

General trends indicate continued increases in both industrial and personal incomes, with or without implementation of the proposal. However, certain sectors would experience direct impacts from implementation of grazing plans and are discussed below.

Regional Livestock-Related Income

Initially, implementation of the proposed action might result in reduced numbers of livestock AUMs being allocated within the Systematic Grazing Management Area. However, the proposal would eventually improve range forage conditions after full implementation occurs (over 15 years), which would lead to increases in livestock AUMs. This, in turn, would allow most area ranchers to increase herd sizes, which would generate additional revenues to ranch operators.

More specifically, livestock AUMs allocated within the Systematic Grazing Management Area would decrease from current levels of 45,491 AUMs to an estimated 35,106 AUMs by the fourth year of implementation (assuming no change in seasons of use). However, by the fifteenth year, an increase in forage quantity and quality would be expected, which would make available an additional 3,976 AUMs for livestock grazing purposes over and above current levels, assuming that wildlife and wildlife uses are satisfied and a total of 49,467 AUMs would be available by the fifteenth year. For a more detailed explanation of these anticipated changes, see the Livestock section of this chapter.

Overall increases in livestock AUMs would, therefore, yield an increase in sales generated from activities in the livestock sector of $31,490 (3,976 AUMs × $7.92/AUM). By comparison, livestock sales for the region (Lassen-Modoc Counties) accounted for over $14.2 million in 1974. Given a livestock multiplier factor of 1.74, additional AUMs generated by the proposal could stimulate economic activity in the region by $54,793 ($31,490 × 1.74). Included is an increase in household incomes of $11,651 ($31,490 × household coefficient of .37). This coefficient was developed from an input-output study prepared by the University of California, Berkeley.

Allotment Livestock-Related Income

With respect to particular operators within the Systematic Grazing Management Area, two permittees in the Tuledad Allotment (Stevensons, et al.) indicate that conforming with the proposed management system would seriously interfere with their current operational regime, as they might have to dispose of their Bear Camp Allotment in the Modoc National Forest (see Livestock section in this chapter for further explanation). As such, the value of Stevensons operation could be reduced by somewhere between $12,000-$23,000. This figure was derived by deducting 12 bulls from 300 animal units, and assuming that the market calf ratio would be 70 percent (thus 202 calves would be marketed annually). Moreover, it has been assumed that each calf would weigh 450 pounds and that a market price of 45 cents per pound would be applicable. Therefore, annual sales could decrease by $40,905. As it costs approximately $125/animal unit for maintenance, however, maintenance costs would also be reduced by cutting the herd by 300 head (by $37,500). Therefore, the net annual loss would be approximately $3,400, which would decrease to zero by the fifteenth year. Using a 12-percent interest rate the discounted value of this $3,400 loss would vary between $12,000-$23,000, depending upon the rate at which the forage productivity on the public lands increases.

However, should Stevensons decide to sell their Forest Service permit for 300 cows (equivalent to 600 AUMs), as the current market value for these AUMs is an estimated $20 per AUM, they might be able to recover up to $12,000 of the costs incurred by them as a result of implementation of the proposal.

The Bicondoa Ranch would also suffer economic losses from implementation of the proposal since grazing would be terminated. The maximum decrease in value to the operation is estimated to be $21,000 (368 AUMs × current market value of $7/AUM × 12 percent interest rate capitalized for a 50-year period).

From a gross livestock sales perspective, the reduction in lamb sales to the Bicondoa operation would amount to approximately $8,370 per year (assuming a lamb crop of 300, marketed at 90 pounds each, with a price of $31 per cwt; Pierce, 1976). The present value of these decreased sales would, therefore, be about $70,000, using a 12-percent discount factor.

In more general terms, for those allotments which are included in the Systematic Grazing Management Area, the operator's discounted costs for operating under the proposed action for a 50-year time span (at a 6⅛-percent interest rate) would be $2,342,850 (see TABLE 3-2d1). This figure includes rancher's costs of maintaining the

TABLE 3-21

DISCOUNTED RANCHER COSTS/REVENUES WITH FULL IMPLEMENTATION OF THE PROPOSAL AT A 6-1/8 TO 12-PERCENT INTEREST RATE (WITH NO CHANGES IN THE SEASON OF USE)

	Discounted Rancher Costs in Present Terms--6-1/8% Interest Rate					Discounted Rancher Revenues			
Allotment	Improvement-Maintenance	Change In[1] Grazing Fees	Existing Level of Grazing Fees[1]	Total Discounted Rancher Costs by Allotment at a 6-1/8 Percent Interest Rate	Changed Quantity of Livestock Forage	Livestock Production (Increased Nos., Higher Weights)[2]	Cull Cows	Existing Level of Livestock Forage	Total Discounted Rancher Revenues By Allotment at a 6-1/8 Percent Interest Rate
Selic-Alaska Cy.	$ 68,621	$ 7,395	$ 38,386	$114,402	$- 25,884	$- 1,261	$ -	$ 134,353	$ 158,976
Tuledad	105,085	- 3,429	339,158	440,814	- 12,002	9,013[3]	780	1,187,053	1,184,844
Denio	86,395	2,193	50,593	139,181	7,674	32,218	-	177,076	216,968
Bare	228,478	60,031	463,736	752,245	211,055	240,584	4,468	1,623,075	2,079,182
Duck Lake	249,562	- 26,459	111,875	334,978	- 92,608	81,553	21,314	391,564	401,823
Lower Lake	17,812	- 6,132	21,625	33,305	- 21,461	11,866	5,221	75,688	71,314
Wall Canyon	37,314	- 4,763	81,606	114,157	- 16,669	79,763	6,363	285,621	355,078
Home Camp	167,951	- 56,597	302,414	413,768	-198,089	180,134	111,329	1,058,447	1,151,821
	$961,218	$- 27,761	$1,409,393	$2,342,850	$- 96,216 (Total Discounted Costs - 6-1/8%)	$ 663,870	$149,475	$4,932,877	$5,620,006 (Total Discounted Revenues - 6-1/8%)

Discounted Rancher Costs at a 12-Percent Interest Rate

Allotment	Improvement-Maintenance	Change In[1] Grazing Fees	Existing Level of Grazing Fees[1]	Total Discounted Rancher Costs by Allotment	Changed Quantity of Livestock Forage	Livestock Production (Increased Nos., Higher Weights)[2]	Cull Cows	Existing Level of Livestock Forage	Total Discounted Rancher Revenues By Allotment
Selic-Alaska Cy.	$ 35,751	$ 3,023	$ 20,579	$ 59,353	$ 10,580	$- 515	$ -	$ 72,025	$ 82,090
Tuledad	73,038	- 10,366	181,819	244,491	- 36,281	3,684[4]	359	636,365	604,127
Denio	46,875	- 44	27,122	73,953	- 153	13,169	-	94,929	107,945
Bare	122,491	14,906	248,603	386,000	52,170	98,336	2,054	870,112	1,022,672
Duck Lake	135,743	- 15,013	59,975	180,706	- 52,543	33,334	9,799	209,913	200,503
Lower Lake	11,776	- 3,281	21,625	30,120	- 11,483	4,850	2,400	40,576	36,343
Wall Canyon	20,886	- 4,748	43,748	59,886	- 16,618	32,602	2,925	153,118	172,027
Home Camp	96,815	- 36,671	162,120	222,264	-128,347	73,628	51,185	567,421	563,887
	$543,375	$- 52,193	$765,591	$1,256,773	$-182,675 (Total Discounted Costs - 12%)	$ 259,088	$68,722	$2,644,459	$2,789,594 (Total Discounted Revenues - 12%)

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[1] Assuming a charge of $2 per AUM per year.

[2] Net change from existing levels of revenue for this proposal at a 6-1/8 percent interest rate is: $777,794 for cattle and $-90,665 for sheep. At a 12-percent interest rate, the net change for cattle is $182,193 and $-37,058 for sheep.

[3] Includes sheep losses of $89.404.

[4] Includes sheep losses of $36,543.

Source: Benefit/Cost Analysis, BLM Susanville District, 1977.

TABLE 3-22
ESTIMATED COSTS OF FACILITIES BY YEAR OF EXPECTED COMPLETION PLUS MAINTENANCE

Type of Facility	Total Units	Per Unit Cost ($)	No.	Year 1 Cost ($)	No.	Year 2 Cost ($)	Total Annual BLM Maintenance Costs	Total Annual Rancher Costs of BLM Facilities for Maintenance
Water								
Springs	38	1,945	38	73,900				
Wells	13	4,000	13	52,000				
Reservoirs	65	3,198	65	207,900				
Pipelines	14 miles	2,000	14	28,000				
Fences								
Divisional	101 miles	1,980			101	200,000		
Exclosures								
Exclosure Fences	32 miles	2,109	32	67,500				
Pipelines & Troughs	6	500	6	3,000				
Seedings	160 acres	25	40	1,000	120	4,000		
Other								
Cattleguards	12	2,000			12	24,000		
Stock Trails	4 miles	1,000			4	4,000		
Totals				$433,300		$232,000	$11,580 1/	$24,515 1/
Income Effects on Local Households 2/				43,330		23,100	3,474 3/	7,355 3/

1/ Figures derived from benefit/cost ratios, which were prepared for each allotment management plan analyzed in this statement. These figures indicate additional maintenance costs that would be required for the proposed range facilities (over and above existing maintenance charges).

2/ Estimate of that proportion of monies spent in construction (personal consumption expenditures) that would actually stay within the region. If it is assumed that 20 percent of total costs would be for wages, then it must also be assumed that only about 50 percent of this 20 percent figure would actually remain in the region for motel rooms, meals, gas, etc. This assumption is made since out-of-area workers would be the principal contract recipient.

3/ Assuming that 30 percent of the maintnenace costs would be for wages and that local labor would be employed.

facilities constructed during the two-year implementation schedule, plus existing maintenance charges, plus the payment of grazing fees to the BLM at a rate of $2 per AUM. To the above figure may be added the costs which would be incurred by Bicondoa because of the cancellation of grazing privileges, bringing total costs to $2,363,850. This figure then represents an estimate of the gross operating costs that the ranching sector in the Systematic Management Area would have to contend with for a 50-year period should the proposal be implemented.

TABLE 3-27 also portrays rancher revenues. The operator's discounted revenues, which could be derived from operating under the proposal for 50 years at a 6⅛-percent interest rate, would be an estimated $5,620,006. This is the sum of the discounted gross revenues which area permittees might receive as a result of livestock consuming forage from the public lands, as discussed in the Livestock section of this chapter.

The difference between these discounted costs and revenues is positive ($3,277,156), indicating that the livestock industry (as a whole) would not be financially eliminated by the proposed action. The use of a higher interest rate (12 percent) for discounting purposes would decrease the apparent difference between discounted costs and revenues. However, even with the 12-percent interest rate, revenues would still be positive—$1,532,821 (see TABLE 3-21).

The present value of the changes in livestock production (relative to existing conditions) over a 50-year time period would be $717,129, assuming production changes for forage, livestock production, and cull cows as depicted in TABLE 3-21 (from benefit/cost analysis, BLM Susanville District, 1977—figure indicates a 50-year time period with a 6⅛-percent discount rate). Changes in cattle productivity would have a present value of $777,794. Sheep productivity changes would have a present value of −$90,665. This negative value would result from reduced lamb weights and does not include the elimination of sheep grazing in the Bicondoa Allotment. Using a 12-percent interest rate, changes in cattle productivity would have a present value of $182,193; sheep productivity would have a present value of −$37,058.

For a summary of the impact of the proposal on herd sizes, cull weights, death losses, calf and lamb crops, etc., refer to the Livestock section of this chapter.

The analysis above relates to conditions which would exist if ranchers adhered to the traditional turnout dates. If they were to change their seasons of use to a later turnout date (that would be consistent with the proposed action), more livestock forage would be available to them in the Systematic Grazing Management Area. It is estimated that as many as 18,323 AUMs over and above existing levels might be possible with a voluntary change in season of use (data available in BLM Susanville District Office).

However, ranchers have consistently stated at public meetings that they oppose any change in season of use in the Tuledad/Home Camp Study Area. This resistance may be based on recognition that some ranchers do not presently have adequate capacity to accommodate the additional cattle and hay production necessary to utilize all of the forage available with a change in season of use. In addition to the economic reasons, the change in season of use would upset a lifestyle which is highly valued by the ranchers. Due to the resistance of the ranchers to changes in season of use, this analysis of socio-economic impacts focuses upon conditions which would prevail under the proposed action with existing turnout dates. Livestock AUM utilization would increase 3,976 AUMs above existing levels by the fifteenth year.

Contract Construction-Related Income

Implementation of the proposed grazing management plans would require construction of numerous range facilities on public lands within the Systematic Grazing Management Area. This construction schedule is shown on TABLE 3-22. Construction costs on Federal lands are expected to reach $665,300, of which area permittees would be responsible for about $60,800.

To estimate the economic benefits that might accrue to the area economy, it has been assumed that 20 percent of total expenditures for Federal range facilities would be returned to laborers in wages. Since most construction would be undertaken by nonregional contractors, only 10 percent of the monies spent for range developments would actually stay within the region, however, assuming that 50 percent of a laborer's wages will be spent locally for purchases of sleeping quarters, meals, gas, entertainment, etc. Therefore, about an additional $66,530 may remain in the local/regional economy as a result of the construction of range facilities on Federal lands over a two-year period.

Using the household to household coefficient from the matrix of direct/indirect requirements (Univ. Calif., Cooperative Extension, 1974, p. 31), this $66,530 would then add $74,513 ($66,530 × 1.12) to household incomes within the region. The amount which would accrue to permanent residents of the region would be $7,983 ($74,513-$66,530) because it has been assumed that the initial amount would all go to nonresident construction workers. By comparison, total earnings for Modoc County in 1974 approximated $35,710,000 (data available in BLM Susanville District Office).

Annual Maintenance-Related Income

Costs that would be assumed by area ranchers for maintenance of BLM facilities are estimated to be $24,515 per year; BLM annual maintenance costs are calculated to be $11,580. These maintenance costs would be ongoing impacts that would continue to occur within the region. Since maintenance is expected to be more labor intensive than construction, and since local labor would be employed in most cases, it has been assumed that 30 percent of total maintenance costs would be for wages, and that all such wages would be spent within the area. As such, annual maintenance costs would add about $10,829 in wages into the local/regional economy each year ($36,095 × 30 percent). Again, using the household to household coefficient developed by the University of California, annual maintenance charges would add $12,129 to personal incomes within the region ($10,829 × 1.12).

Ranchers who would have to assume maintenance costs on Federal lands as a condition of AMP implementation might view such expenditures as a severe drain on their working capital. On the other hand, these expenditures should increase the incomes of certain area residents, such as area ranch hands, small businessmen, etc.

Recreation-Related Income

It is not possible to attach a dollar value to activity occasion figures in order to derive recreational expenditures for the region since such ambiguous items as the social worth of hunting, fishing, etc., are being dealt with. How monies spent by sportsmen would stimulate the area economy of Surprise Valley cannot be measured.

However, if the proposed action is implemented, activity occasions are projected to increase by 58 percent over existing (1976) levels (from 34,000 to 53,800). This increase is relatively small in comparison to existing regional levels of activity occasions, however, which exceed 60 million. For further clarification, refer to the Recreation section of this chapter.

Other Income Results

Since additional studies would be conducted on the eight allotments should the proposal be implemented, two additional seasonal workers might be hired by BLM in Cedarville for up to three months each year per employee. Therefore, annual BLM salaries might increase by about $6,000 (assuming an annual salary of $12,000). Installation of range facilities, ensuring that grazing plans are followed, checking for trespass, etc., would not require the addition of other new employees, however; permanent employees would be expected to handle this work.

The Soil Conservation Service would be expected to expand its work force by two full-time positions to work with the BLM on monitoring impacts of the proposal on vegetation and soils. Annual salaries for these employees are estimated to be $12,000 per year per employee. As both the BLM and SCS maintain offices near the impacted area, it is assumed that these increases in gross salaries would positively impact the area economy. This increase in Federal employment might be viewed somewhat negatively by area residents, however, since the government sector is already the largest employer in the region.

SOCIAL SUPPORT FACILITIES AND SERVICES

The collective impacts of the proposed action would not appreciably change the use patterns of existing support facilities and services. Population trends would undoubtedly continue with or without the grazing plans. Employment figures might increase for a short time during construction, but impacts on the community would be insignificant. It is also doubtful whether projected increases/decreases in income levels would significantly impact existing health, police, fire, water, sewage and other social support systems.

PUBLIC FINANCE AND TAX BASE

Under California's Head Day Tax (1971), livestock are subject to the following ad valorem tax during the time they are owned:

cows/heifers—.5 /animal day or $1.86 per year; ewes—.25 /animal day or $0.93 per year. Calves/lambs under 6 months of age are exempt. Bulls and bucks are taxed at 25 percent of the market value multiplied by property tax rates (which, for rural areas in the region, averages about $8 per $100 of assessed value). Therefore, bulls (current market value of $500/head) are taxed $10 per head per year; bucks (present worth of $40/head) are taxed $0.80 per head per year (Nave, 1976).

It is estimated that, with full implementation of the proposed action, livestock numbers would increase by 730 sheep and 550 cattle. Assuming four bulls per 100 cows and five bucks per 100 ewes, the following breakdown in additional livestock numbers after the fifteenth year would be reached: 22 bulls and 528 cows; 37 bucks and 693 ewes. Therefore, given the State's Head Day Tax, implementation of the grazing plans could annually generate $1,880 in additional tax revenues after the fifteenth year.

Implementation of the proposal might influence land values or unit prices of the various allotments, because the privileges associated with a BLM grazing lease, license, or permit carry a value which is reflected in the purchase price of base properties. Number of AUMs, quality of forage, numbers and condition of range facilities, grazing fees, etc., all affect this value.

If this proposal is implemented, the eight operators (and 12 permittees) within the Systematic Grazing Management Area could have their property values increased by approximately $228,000. This figure reflects an increase in livestock forage consumption of 3,976 AUMs by the fifteenth year, continued production at that level through the fiftieth year, and discounting the value of this increase back to the present using a 12-percent interest rate.

Assuming that methods of calculating taxes were to remain constant for the next 15 years (25 percent of market value × $8 per $100 of assessed value), appproximately $4,500 in additional tax revenues could be generated annually by the proposal.

SUMMARY

Employment

Implementation of the proposed grazing plans might require area ranchers to hire additional seasonal (or full-time) ranch workers for maintenance, moving livestock, etc. These additions would total about 96 manmonths per year. Federal supervision might require the hiring of two seasonal temporary employees at the BLM Cedarville Office to undertake condition-trend studies on the allotments (6 MM/year). In addition, two permanent Soil Conservation Service positions might be opened to coordinate the monitoring of impacts of rest-rotation grazing systems on the region's soils and watershed (22 MM/year). Finally, approximately 115 manmonths of construction labor would be utilized during the two-year implementation schedule.

Implementation Costs

The Bureau of Land Management (along with area permittees) would spend over $665,000 on construction costs and materials during the two-year implementation schedule for range facilities (plus monitoring and tests). Permittees would also have to assume maintenance responsibilities for the above BLM facilities, which could exceed $24,000 per year (not including $11,000 in maintenance costs that would be borne by the BLM). Area ranchers might be significantly impacted during the short-term construction phase, as they would be encumbered by capital outflows for maintenance and developments without benefit of increasing nerd sizes to offset these expenses. However, other resource values such as wildlife, wild horses, and recreation might benefit from such implementation almost immediately.

Incomes

The proposed grazing plans would increase the amount of licensed grazing use at the end of 15 years by an estimated 3,976 AUMs (assuming that turnout dates remain the same). Therefore, household incomes could annually increase by an estimated $11,000. This figure also includes incremental increases in wages paid to ranch employees.

If turnout dates were later in the year, forage made available to livestock would be substantially higher (up to an estimated 18,323 AUMs), which would result in increased revenues derived from livestock sales and, therefore, increased household income levels.

Incomes which would be retained within the region from the construction of major range facilities are expected to reach about $66,500. Household incomes which would accrue to permanent residents of the region would therefore approximate $7,900. In addition, wages derived from the maintenance of these facilities could directly generate an estimated $11,000 annually into the area economy which, using a household coefficient, would add approximately $12,000 to personal income levels within the region.

Income in wages and salaries for Federal employees should total about $30,000 per year.

Livestock Sales

The present value of increasing cattle sales which would accrue to operators within the Systematic Grazing Management Area would be $780,000 using a 6⅛-percent interest rate. However, the present value of gross sheep sales would decline by around $91,000, signifying a negative change in productivity. At the 12-percent rate, cattle productivity increases, which are reflected in increased sales, would be around $180,000, although sheep operators would still experience a decrease of $37,000.

For Stevensons, et al., implementation of the proposal would decrease the present value of their operation (through livestock sales) by between $12,000–$23,000 during the first 15 years of operation, unless they were to sell their Forest Service grazing permit in an attempt to offset some of this loss.

Bicondoa's sales would be reduced by approximately $8,400 per year, this reduction having a present value of about $70,000.

Taxes

Property tax revenues would increase by about $6,400 annually once the proposal were fully implemented, including increased values in both base property valuation and increased inventories of livestock.

Land Values

By the fifteenth year base property values could theoretically increase by $228,000 over current (1976) prices as a result of implementing the proposal. Therefore, even though some area ranchers (such as the sheep operators or Stevensons) might be negatively impacted in terms of productivity losses, the market value of all ranch operations within the Systematic Grazing Management Area would increase.

Social Characteristics

Because of the state of the art on social prediction, a high degree of accuracy in assessing social impacts is unlikely. The following discussion will be limited to showing some of the correlations between changes in behavior patterns and their influence on the formation of new attitudes, i.e., whether an individual may be forced to change an older attitude or to adopt a new one which corresponds with new behavior patterns to remain rationally consistent.

Anticipated increases in vegetation under the proposal would lead to increased deer and antelope numbers. People who value increased numbers of harvestable game species and/or who value the intrinsic importance of wildlife might therefore consider the proposal to be beneficial.

Increased numbers of wildlife, if accompanied by more abundant and diverse vegetative species, might also increase the quality of other recreational pursuits, such as sightseeing and photographing wildlife. Also, since many people perceive wildlife conservation-protection-enhancement as something to be sought continuously, nonresidents might view the proposal in a more favorable light if they feel that wildlife values are receiving due consideration. This sense of husbandry is thought to be held by the general public, as well as the local land-holder, land manager, and local outdoorsman.

If the proposed action is implemented, a small band of Bighorn sheep would be reintroduced to the Bicondoa Allotment. To those who feel the area must be used for economic purposes or for consumptive uses such as hunting, the introduction and protection of a regionally unique species might appear to render no useful service to society. To others, this reintroduction might be the most valuable portion of the entire proposal.

If the construction of fences and other range facilities are developed as proposed, serious objections might not be raised by the general public. Because of the intrinsic values which encompass wildlife, however, the proposal might still be viewed by some with skepticism. For example, placement of fences and water developments could be very beneficial if handled wisely (by permitting better dispersal of livestock), or it might adversely affect wildlife and horses (through blockage of important migration routes or injury). Unfortunately, attitudes which will be prevalent in the future cannot be ascertained. Therefore, value judgments about construction can not be positively identified until such construction is initiated.

To the degree that wildlife would be positively impacted by the proposal, those who value wildlife (whether for consumptive or nonconsumptive purposes) might view the entire proposal favorably. Yet others might be disappointed since the proposal is multiple-use-oriented and not intended to benefit one dominant use.

In addition to having an impact on values or attitudes about wildlife, the proposal might have similar effects with regard to recreational use within the study area.

"Recreation" is not necessarily only the outdoors but also includes one's reaction to it; that is, quality-of-life measurements depend not so much on what is seen, but on one's perception of what is seen. For some, recreation involves possession, appropriation, consumption; for others, it involves the capacity to define, be appreciative of, and be content with intrinsic items directly correlated to the outdoors. Therefore, attitudes and behavior may be widely divergent, depending upon the user category being considered.

First, it is anticipated that full implementation of the proposed action would increase available habitat for deer and antelope. To the extent that this goal is viewed as being accomplishable, regional hunters might favor the proposal. However, if numbers of game animals were to increase significantly, hunters from outside the region might also be attracted into the Tuledad/Home Camp Study Area, which could create competition for harvestable game. If a change in behavior were brought about by this competition (via the proposed action), a more negative attitude about the proposal could be created.

Second, implementation of the proposal could enhance the sheer beauty of the area. Those who value scenic attributes might then perceive the plan as beneficial. However, what constitutes "beautiful scenery" can vary from individual to individual. Moreover, the anticipated improvements in visual quality are of a long-term nature; during the actual construction phase, numerous range facilities would be added to an area relatively free of man-related intrusions. This construction, although adding to the overall improvement of wildland conditions, could reduce visual aesthetics, which in turn might lead to the formation of negative attitudes about the proposal. For example, those who expect immediate results in visual quality of the area might be disappointed when they confront a "use" pasture. This disappointment might create an impression that the proposed action is generally unworthy.

Moreover, while some individuals could accept certain developments, such as additional fences, in visually scenic region, others might prefer that the area remain essentially untouched. For instance, hunters and ORV enthusiasts might oppose new fences since fences could impede their movements and change their behavior patterns. According to the Woody study (1968), when asked if there had been any particular man-made changes which the users disliked, 18 percent of the respondents cited, as their major complaint, "too many new roads"; the second major complaint was "opposition to new fences being constructed" (Woody, 1968, p. 53). If behavior patterns were to change, however, incompatibility between current behavior and former attitudes might bring about the formation of new attitudes. Hunters might then rationalize that fences would lead to better livestock control, which might lead to increased forage, which could ultimately lead to more abundant game.

While some range facilities might promote positive and/or negative attitudes, it would be likely that the development of new waters would be positively received. However, the number of facilities seen as needed might vary by individual; for example, a hunter might advocate more new developments than would the wilderness buff, for he might consider water to be the limiting factor in increasing game species numbers. Also, use around proposed water developments might create conflicts between recreationists and area ranchers, possibly promoting negative attitudes.

A third area of concern involves artifact hunting and rockhounding. It is acknowledged that sparse vegetation and active erosion help uncover collectible items. If implemented and successful, the proposed action would stop excessive erosion and increase ground cover throughout the study area. To the professional archaeologist, this might be a very positive step in reducing losses of valuable sites to the illicit collector. To the weekend collector, a recreational pursuit might be lost. These induced changes of behavior would be most likely over an extended period of time. During the initial construction stage, disturbed areas might open new areas to collection, even though developed sites would be located away from potentially valuable archaeological areas. If behavior is changed, it could affect attitudes, which could determine how these recreational groups would perceive the proposal.

Through implementation of the proposal, certain forage benefits would be derived by wild horses left within the study area. Therefore, many individuals might perceive the proposed action in a favorable light. However, "we may also dislike some things which we evaluate positively" (Bem, 1970, p. 15). In other words, if the construction of certain fences were to impede even the movement of just one or two bands of horses, the overall perception of the plan might not be held in high esteem. In addition, the construction of divisional and exclosure fences might significantly increase the possibility that wild horses might injure themselves, or might be trapped inside a small area (away from forage and water). If such were to occur, the humaneness of the proposed action might be questioned. In essence, the enthusiast might have two beliefs: (1) that range facilities might destroy his perception of what a "wild, free-roaming creature" is; and (2) that the proposal might result in benefits to wild horses since range facilities would help disperse livestock, create additional waters, and improve the range forage.

From the standpoint of induced behaviorial changes which would result from the proposal, the ranching sector within the management area also merits attention.

Implementation of the proposal would lead to additional livestock use being allowed, once wildlife-wild horse forage needs are satisfied. Therefore, the plan might be viewed favorably by area ranchers. Yet implementation of the grazing management systems would also place the ranchers in a precarious position: if, after monitoring, the range did not respond, reductions in livestock numbers or changes in the seasons of use might be implemented by the Federal government. Thus, the proposal has the potential for severely impacting ranchers, both economically and socially, which could lead to divergent attitudes, depending upon expectations.

Additionally, ranchers would not have a veto power over this proposal. They could refuse to sign a specific allotment management plan, but such plans could be implemented by decision. This situation might increase anxiety levels for ranchers. Some ranchers might advocate greater Federal control over their operations, providing there would be a reasonable expectation of deriving certain economic benefits, e.g., through increased weaning weights, heavier cull cows, higher calf crops, etc. If this expectation were thought to be achievable, then the loss of local "self determinism" could be rationally reconciled. For others, giving up the management latitude they now have would be irreconcilable. The thought of losing control over one's destiny might be of such importance that, even if the proposal were successful, attitudes might remain negative.

Other social impacts are those changes in lifestyle that would occur during the implementation period, or shortly thereafter. Livestock grazing would cease in the Bicondoa Allotment, and there would be a possibility that grazing in the Selic-Alaska Canyon Allotment might be halted if, after three cycles, the range did not improve. Eliminating grazing from an area that ranchers have used historically might negatively influence their receptivity to the proposal. Such terminations would probably not lead to positive attitudes being formed through conflict between current behavior and former attitudes either, since induced behaviors would differ substantially from previously accepted norms. What might occur instead is that negative attitudes might remain because of denial or bolstering (see GLOSSARY).

Scientific (systematic) grazing management with all of its sophisticated concepts (turnout on seed-ripe dates, etc.) might also be opposed by those individuals who relate strongly to the older concept of ranching in an "open range" environment, with minimal fencing or other developments, letting livestock range freely over a large area. For these individuals, ranching is a tradition, based upon years of experience under trial and error methods. Applying new procedures could lead to unanticipated results, which might not be easily accepted by those from a basically conservative background.

Another indirect impact concerns the social organization of ranching communities. Many ranchers might support the proposal since they perceive that such efforts (if successful) could lead to greater economic returns in the future. Also, they would be allowed to continue in their chosen profession, albeit somewhat altered because of closer supervision by the Federal government. However, these same ranchers might hold entirely different attitudes about how the proposal would impact long-time associates.

Those experiencing large reductions, or even total removal, might receive support from ranchers who would not be reduced. For example, Mrs. Bicondoa and the other sheep operators (and Stevensons) might perceivably suffer severe economic losses, although other area cattle operators might be positively impacted. This could lead to the formation of new attitudes; sheep operators might desire a change in their grazing permits which would allow them to run cattle, and they could be supported by other area ranchers in their request. Or Mrs. Bicondoa might receive community support if she were to appeal the decision to terminate her grazing privileges. If the proposal were ultimately to force some resident operators out of business, which might lead to further ranch consolidations, there is reason to suspect that the proposal would be objected to by those individuals who oppose "corporate ranch operations."

Each rancher within a given allotment would also be responsible for upkeep and maintenance of range facilities after construction. These expenditures would amount to several thousand dollars per year, creating quite a dilemma for ranchers, since increases in livestock use are not contemplated in the immediate future. To reduce anxiety

patterns might require readjustment or formulation of different attitudes.

levels, some ranchers might rationalize that even though more livestock could not be run on a given allotment, increased red-meat production would help offset capital expenditures. However, if reference groups of other ranchers do not perceive economic returns resulting from similar proposal, then, even though a given behavior pattern would be induced and the grazing plan followed, area ranchers might forecast that the proposal would spell economic calamity for their operations. In addition, water developments often attract other user groups, such as recreationists, which then would compete with livestock for use of the site. Thus, area ranchers could hold differing attitudes about new water developments.

In conclusion, self-fulfillment values (where each individual is encouraged to do what he desires) would be lost by certain individuals within each of the interest groups discussed above, should the proposal be implemented. It is not known whether induced behavior change would be accompanied by new attitudes, or whether prevalent attitudes would be retained. It would be likely that, for some, prevalent attitudes might be reinforced; for others, changing behavior

Chapter 4

MITIGATION MEASURES

Chapter 4

MITIGATION MEASURES

The measures described in this chapter are actions that will reduce or eliminate adverse impacts of the proposed action identified in Chapter 3. If the proposed action is implemented, all mitigating measures described in this section constitute a commitment of the Bureau of Land Management.

Miscellaneous Measures Required

(1) Pursuant to Section 106 of the National Historic Preservation Act and Paragraph 2(b) of Executive Order 11593, the California and Nevada State Historic Preservation Officers and the Advisory Council on Historic Preservation will be provided documentation and allowed to comment prior to the implementation of all actions which might adversely affect cultural resources eligible for inclusion on the *National Register of Historic Places*. This measure will apply as well to cultural resource impact mitigation measures listed below.

(2) Seven archaeological sites and three districts (650 acres) potentially eligible for nomination to the *National Register* will be fenced (4 miles) to exclude or divert the passage of livestock and prevent disturbance by trampling during the first years of implementation, the fencing will be maintained or terminated in response to the findings of the monitoring system.

(3) Equipment access routes will be surveyed and staked in concert with archaeological reconnaissance to ensure that cultural sites are not transected.

(4) Access roads for construction of springs and reservoirs will be temporary. Where access routes leave visible corridors, the corridors will be blocked or obscured to prevent the proliferation of unplanned roads.

Measures Altering the Proposed Grazing Systems

(5) The custodial management allotments will be included in the monitoring system and livestock grazing will be regulated or excluded if monitoring indicates damage to values which warrant such action.

(6) Conversion of sheep licenses to cattle will be allowed for sheep operators in the Tuledad and Selic-Alaska Canyon Allotments pursuant to application and consideration by the operator, Area Manager, and District Manager.

(7) The sequence of grazing treatment for the first year will be changed in the Home Camp and Lower Lake Allotments as shown below:

Allotment	*Treatment and pasture*
Home Camp	Treatment A—Hart Camp. Treatment B—Grass Lake. Treatment C—Hays Canyon.
Lower Lake	Treatment A—South. Treatment B—North. Treatment C—Middle.

(8) Construction activities will be delayed until after July 15 within one-half mile of known raptor nest sites.

(9) Public lands in the custodial management areas will be included in the inventory component of the cultural resources monitoring program during the first year of implementation, and livestock grazing will be regulated or excluded if adverse impacts warrant. These areas will follow as a second priority to the intensive management areas to be monitored as funds and manpower dictate.

(10) Livestock turnout dates will be no earlier than April 15 in any year in any allotment. There will be a one-third reduction in livestock numbers (excluding Wall Canyon) in the first year of the grazing cycle.

(11) All livestock will be removed from and prohibited from using the "use" pasture (Treatment A) after the "seed-ripe" date.

(12) Livestock operators will be allowed to adjust seasons of use during the initial "phasing-in" cycle (first three years) to attain balanced use of the "use" and "seed-ripe" pastures; but in no case will livestock grazing be allowed to start earlier than April or to continue beyond October 31.

(13) Livestock grazing pressure (AUMs) will be adjusted to insure that no more than "moderate use" is attained in any pasture. (Moderate use is 41-60 percent utilization. Range appears entirely covered as uniformly as natural features and facilities will allow. Fifteen to 25 percent of the number of current seedstalks of key species remain intact. No more than 10 percent of the number of low-value forage plants utilized. Moderate use does not imply proper use.) Utilization in every pasture will be monitored throughout each grazing period.

During the "phase in" cycle, when utilization falls in the "moderate use" class in the "use" pasture, all livestock will be moved into the "seedripe" pasture. If moderate use is attained in this pasture before the termination date of licensd use, all livestock will be moved into the "rest" pasture. If moderate use occurs in this pasture before the date licensed use terminates, all livestock will be removed from the allotment.

Adjustments in qualifications will be made where necessary at the end of the initial cycle and before the first grazing season of the second cycle. Adjustments will be made so that the grazing formula can be followed as designed without exceeding moderate use in any of the pastures.

The basis for the adjustments will be the actual-use records for forage actually harvested in each pasture during the initial cycle. These data will be judged in context with the effective precipitation experienced for each year, as compared to the norm, plus a measurement of the utilization levels achieved. For example, if the experience in the initial cycle shows that the pasture available for use during the second cycle will support only 200 cattle for five months (1,000 AUMs) without exceeding moderate use and the active qualifications provide for 1,200 AUMs of use, then the active qualifications will be reduced to 1,000 AUMs and 200 AUMs will be shifted to suspended non-use.

Rain gages will be installed and monitored in each allotment to assess effective precipitation.

Measures Concerning Facilities to Implement the Proposal

FENCE AND CATTLEGUARD CONSTRUCTION

(14) Where fences are built in areas previously undisturbed or where no access exists, construction materials will be hauled to fencing sites and distributed in a manner to cause least surface disturbance.

(15) Cattleguards will be painted with a color that most closely blends with the surrounding vegetation and soil.

(16) Where it is noted that new fences abruptly cross trails used by recreationists, gates will be provided and signs posted far enough down the trails to warn of the newly constructed fences.

(17) Where grey steel fence posts do not blend with the color of the immediate environment, another color/material that blends more closely will be used, especially in Class II lands, except for within or around areas which have a high concentration or use by wild horses.

(18) Fences will be constructed, where practical, in a manner to avoid long, straight segments, such as in Class II lands along Highways 81 and 34.

(19) Fences will not be skylined on steep slopes except where necessary within or around wild horse areas. Fence No. 186, from Worland Ranch to Cottonwood Mountain, in the Tuledad Allotment, will be skylined where possible.

(20) Where springs and reservoirs are fenced, fences will be designed to avoid rectangular configurations by following natural contours as much as possible.

(21) Double 16-foot gates will be placed on all horse trails or routes of travel that cross proposed fence No. 186 and all gates in allotments will be left open except when it is necessary to close them to control livestock. In no case will gates be left closed between October 31 and April 1 of each year.

(22) There will be no fencing of the following proposed grazing exclosures within the boundaries of the Tuledad and Fox-Hog Mountain horse use areas shown on MAP 2-13.

Springs—Tuledad Allotment, Project Nos. 22, 33, 116, 94, 70;
Bare Allotment, Project Nos. 61, 174
Reservoirs—Project Nos. 5, 115, 117, 119, 132
Exclosures—Project No. 197

(23) Intensive survey of specific areas for fences and other linear facilities such as livestock trails and pipelines will be performed prior to construction so that changes in routes can be made to avoid impacts on petrified wood and cultural resources. As a last resort, where this is not feasible archaeological salvage will be performed pursuant to procedures outlined in Section 106 of the National Historic Preservation Act and Paragraph 2(b) of Executive Order 11593 for cultural resources and petrified wood.

WATER DEVELOPMENTS

(24) Springs, reservoirs, pipelines, and well facilities will be developed with the least possible soil and vegetation disturbance.

(25) Areas disturbed for reservoir and livestock trail construction and the reseeding test plots will be reseeded with a variety of native species, in addition to species specified for seeding tests, that most closely blends with the surrounding vegetation.

(26) The construction of 10 spring development sites which have been identified as having high cultural values will be monitored by a profes-

sional archaeologist, authorized to halt development if necessary, to ensure that subsurface cultural deposits and surface patterns are not disturbed.

(27) Two proposed reservoirs will be relocated along the same drainage in concert with archaeological survey to avoid impacts to cultural resources. If this is not feasible (i.e., if suitable, impact-free locations cannot be found), archaeological salvage will be conducted pursuant to 106/2(b) recommendations.

(28) Windmills will not be skylined within view of Highways 34 and 81.

(29) Water troughs will be of a color that blends with natural surroundings and will not be skylined in view of main roads.

Roads and Trails

(30) No new roads or trails will be constructed in Class II lands.

(31) Since access roads to wells will be used continuously for maintenance purposes, they will be designed with the following considerations: location as to topographic contour; width of rights-of-way; screening with natural vegetation; and placement of culverts and water bars.

(32) When no longer needed for livestock movement, trails will be closed and rehabilitated to as near natural conditions as possible.

(33) Chainings will be conducted as near to contour as possible, especially on the second pass of the two-way chaining, so that brush piles and chain marks will aid in preventing erosion of the exposed soils. The edge will not be left in long, straight segments.

(34) In the proposed chaining areas, revegetation will be with a variety of species that most closely matches the desirable species of adjacent natural vegetation, to enhance the chances for successful establishment because of adaptability and to aid in blending with the surrounding vegetation.

Monitoring Programs

Cultural Resources

To ensure that implementation of the proposed action will not have a cumulative impact which goes unnoticed until too late for mitigation, a Cultural Resources Monitoring Program has been initiated which addresses three problems:

(1) To assess ongoing impacts upon *National Register* eligible cultural resources,

(2) To identify in quantifiable terms the cumulative impacts of cattle grazing on cultural resources throughout the spectrum of environmental settings, and

(3) To expand the inventory of cultural resources in the area, and to assess the intensity of forces currently impacting them, as well as the proposed grazing management, if and when it is implemented.

The monitoring program will be implemented in three arenas:

(1) All sites and districts identified as eligible for nomination to the *National Register of Historic Places* will be visited annually at the completion of each stage in the grazing cycle. A log will be maintained on the cumulative impacts on each, and 106/2(b) procedures followed where adverse impacts are identified.

(2) To address the problem of quantification of grazing impacts, a series of 16 test plots will be laid throughout the environmental strata tested archaeologically (by soil/physiographic group and by modern vegetation community). Plots will be distributed so that in each stratum one plot occurs where cattle concentrate (as at water sources) and one where cattle passage is related only to grazing. Each plot will consist of 100 number-coded nonprehistoric lithics, arrayed at the interstices of a 100 cm grid imposed over a 10 — m^{-2} tract. Each plot will be monitored annually, and the cumulative spatial displacement of specimens recorded. Nearest-neighbor analysis (Clark and Evans, 1954) will be performed to determine the degree to which originally uniform distributions are transformed to clustered or random ones.

(3) In order to broaden knowledge of the cultural resource base of the area and to identify *National Register* eligible sites (or other sensitive sites) which are being impacted adversely, a continuing archaeological inventory will be undertaken. The inventory will proceed at the minimum rate of 1 percent of the area (about 11 square miles/year) and will expand upon the stratified random sample already surveyed.

Each aspect of the monitoring program may result in data which will require further mitigating measures, including, but not limited to, exclusions from grazing (fencing), adjustments in the location of developed water sources, and archaeological salvage. In all cases where adverse impacts are identified, 106/2(b) procedures will be followed.

Tables 4-1 through 4-9 delineate (1) impacts of the proposed action on each environmental component, as described in Chapter 3, (2) the specific measures as described above in this chapter which will be applied to mitigate those impacts, and (3) the anticipated degree of impact reduction.

TABLE 4-1

VEGETATION RESOURCES

Impacts	Mitigation	Reduction Due To Mitigation
1. Adverse impacts resulting from soil compaction due to trampling would be greatest when the soil is damp. Normal root development would be restricted, infiltration rates reduced (thus reducing available water for plant growth), and difficulty of seedling emergence and establishment increased. The early turnout dates (March 16, April 1, and April 16) of the proposed action would lead to an unnecessarily high degree of soil compaction due to trampling of damp soil.	#10	1. Variable, depending upon climatic conditions, but usually about 10-15 percent. Trampling would continue to be an adverse impact, but effects specifically related to trampling wet soil before "range readiness" will be slightly alleviated.
2. Seasons of use would be unequally balanced around the "seed-ripe" date of bluebunch wheatgrass in the three-pasture grazing management systems, resulting in concentrated use in the "use" treatment pasture and disproportionately low use in the "seed-ripe" treatment pasture. Adverse impacts of the "use" treatment would thus be unnecessarily high, and beneficial effects of the "seed-ripe" treatment would be unnecessarily low.	#10, #11, #12	2. Estimated 90-95 percent. Seasons of use should be equally balanced around the "seed-ripe" date of the key species in most years.

TABLE 4-1 (Continued)

Impacts	Mitigation	Reduction Due To Mitigation
3. The proposed stocking rates would result in a considerable increase in grazing pressure in the three-pasture grazing management systems and approximately a 100-percent increase in the two-pasture system. Grazing capacities are unknown, but very great reliance is placed on the monitoring systems to demonstrate the need for adjustments in grazing pressure. An unknown probability of excessive use exists in each pasture, yet data from a minimum of two grazing cycles following the initial "phasing-in" cycle would be required before the need to adjust is evident (a total of nine years in the three-pasture systems and six years in the two-pasture system). Resource degradation would occur in any pasture overstocked during that period.	#10, #11, #12, #13	3. 90 to 95 percent. Adjustments of seasons of use and removal of all livestock from the "use" pasture at "seed-ripe" date will lessen the grazing pressure in the "use" treatment. Regrowth resulting from late summer and fall precipitation will not be grazed by livestock in the "use" treatment. Thus, the adverse impacts of the "use" treatment will be lessened. Application of "moderate use" standards will provide a safeguard to prevent resource degradation due to excessive livestock use (Note: this will not eliminate problems associated with livestock concentration areas nor the problem of inadequate rest being provided for antelope bitterbrush and aspen, but it will greatly alleviate the impacts on bitterbrush).
4. Shrubs that replenish carbohydrate reserves during late summer and fall and are browsed at that time would be utilized during critical growth periods in two of every	#11, #13	4. Variable, but approximately 50-75 percent. Removal of all livestock from the "use" pasture at the "seed-ripe date" will eliminate livestock use during late summer and fall in the "use"

TABLE 4-1 (Continued)

Impacts	Mitigation	Reduction Due To Mitigation
three years in the three-pasture systems and every other year in the two-pasture system. Heavy utilization would result in decreased vigor.		treatment of the three-pasture grazing systems. Although palatable shrubs might be sought by livestock, the "moderate use" limitation will relieve the overall grazing pressure exerted on any pasture. Thus, the level of browse utilization will be reduced. The net effects will be an increase in the amount of rest provided and a reduction in the level of utilization. Utilization pressure will be considerably less than that experienced in years immediately prior to implementation of the proposed grazing management systems, and all browse species are expected to be benefitted. Vigor of antelope bitterbrush is thus anticipated to increase; but whether the apparent downward trend in most stands will be halted is unknown. Shrubs in close proximity to livestock concentration areas will not be benefitted by this mitigation.
5. Increased livestock grazing pressure above existing levels in two of every three years in the three-pasture grazing systems and every other year in the two-pasture system would result in increased trampling damage and and ground-cover removal.	#13	5. 90 to 95 percent. The "moderate use" limitation will result in livestock grazing pressure remaining equal to or becoming less than experienced in years immediately prior to implementation of the proposed grazing management systems.

TABLE 4-1 (Continued)

Impacts	Mitigation	Reduction Due To Mitigation
6. The proposed action includes no measures to ensure against resource degradation in the custodial management allotments. The probability of adverse vegetative impacts due to overgrazing in these areas is unknown.	#5	6. Variable. Monitoring of resource response to grazing management in the custodial management allotments will provide information necessary to impose restrictions on grazing pressure as needed. Monitoring cannot provide information to prevent resource degradation in the interim, however.

TABLE 4-2

SOIL RESOURCES

Impacts	Mitigation	Reduction Due To Mitigation
1. Increased soil movement, bare ground and subsequent soil loss during Treatment A (first year) in all allotments.	#10, #11, #12, #13, #24	1. Estimated 40-60 percent less soil movement and loss.
2. Moderate impact on surface permeability and available water capacity due to decreased pore space in surface soil on most habitat types during first grazing cycle.	#10, #11, #13	2. Estimated 60 to 70 percent effectiveness in increasing surface permeability and available water capacity.
3. Slight impact on soil productivity due to construction and maintenance of reservoirs, springs, roads, and trails.	#24, #25, #30, #31, #32, #33	3. Estimated 70-80 percent.

TABLE 4-3

WATER RESOURCES

Impacts	Mitigation	Reduction Due To Mitigation
1. The first year of of Treatment A in Pasture 1 would cause increased bare ground which could cause 10 percent or greater increase in surface runoff in both the two- and three-pasture systems. Precipitation frequency and intensity are the controlling factors even though the Treatment A pasture, in all cases, would be vulnerable to increased surface runoff.	#10, #11, #12, #13	1. Greater than 70 percent.

TABLE 4-4

WILDLIFE RESOURCES

Impacts	Mitigation	Reduction Due To Mitigation
1. A 1 to 10 percent loss of deer herd expected during the first year.	#7	1. 24 percent decrease in losses on summer range, theoretically, if Treatment C pastures are not utilized during the first year of implementation; actual reductions are not known.
2. Injury or possible death to deer and antelope due to proposed fences.	#19, #21	2. Less than 25 percent.
3. Frightening of raptors during nesting season by construction.	#8	3. Greater than 80 percent.
4. Downward trend and low plant vigor of bitterbrush stands which provide deer forage.	#11, #13	4. 50-70 percent; whether downward trend will be halted is unknown.
5. Increased livestock use of bitterbrush on two-thirds of the study area per year.	#13	5. 50-75 percent reduction in livestock-deer competition.
6. Spring and early summer competition in Treatment A pasture because of livestock concentrations.	#10, #13,	6. 70-80 percent.
7. Expected long-term deer herd reduction of 10-20 percent.	#11, #13	7. 100 percent reduction in long-term herd losses; 20-30 percent increase in deer numbers.

TABLE 4-4 (Continued)

Impacts	Mitigation	Reduction Due To Mitigation
8. Expected short-term deer herd reduction of 5-10 percent.	#11, #13	8. 100 percent reduction in short-term herd losses; 5-10 percent increase in deer numbers.
9. Strong competition between livestock and antelope at greenup in Treatment A pasture.	#11, #13, #7	9. 50-75 percent.
10. Summer competition between livestock and antelope for bitterbrush forage on two-thirds of the study area.	#11, #13	10. 70-80 percent.
11. Annual heavy grazing of one-third of the sage grouse habitat.	#13	11. 100 percent -- reduction of livestock grazing from heavy to moderate in Treatment A pasture.
12. Late summer and fall heavy removal of vegetation by livestock, decreasing sage grouse winter cover.	#11, #13	12. 50 percent or greater.
13. Short-term annual decrease of sage grouse on 30-38 percent of study area.	#11	13. 100 percent.
14. Livestock disturbance and destruction of birds' nests.	#10, #13	14. 30-50 percent.
15. Removal of vegetation required for food and cover by nongame species in Treatment A and B pastures.	#11, #13	15. 30-50 percent.

TABLE 4-4 (Continued)

Impacts	Mitigation	Reduction Due To Mitigation
16. Removal of valuable bank and shoreline vegetation.	#10, #11, #13	16. 15 percent -- the downward trend would continue on systematic management areas but at a reduced rate from that described in Chapter 3. Although livestock numbers will be lessened by the one-third reduction and by the "moderate use" limitation, cattle would continue to concentrate on the riparian flora for two out of three years. Defoliation of valuable ground and shrub cover is anticipated.
17. Mechanical damage of banks and shorelines caused by livestock trampling.	#10, #11, #13	17. 25 percent reduction resulting from a decrease in duration of use during Treatment A and a one-third initial reduction in livestock numbers. Streambank stability would continue to decline, however, due to inadequate amount of rest provided by the system prior to and during systematic grazing.

TABLE 4-5

WILD HORSES

Impacts	Mitigation	Reduction Due To Mitigation
1. Restriction of horse movements due to pasture fences (#186 in particular), especially between (1) Worland Ranch and Cottonwood Mountain, and (2) the area two miles south of Mahogany Mountain.	#17, #19, #21	1. 40-70 percent.
2. Horse injuries due to exclosure fences, especially in high-concentration areas, such as water sources, commonly used feeding areas, and trails. Project # 197, around Garden Lake, is of particular concern.	#17, #19, #21, #22	2. Greater than 70 percent.
3. During Treatments A and B under the proposed stocking rate, the availability of winter forage for wild horses might be lacking during some years.	#10, #11, #12, #13	3. Greater than 70 percent.

TABLE 4-6

VISUAL AND RECREATION RESOURCES

Impacts	Mitigation	Reduction Due To Mitigation 1/
1. Fence construction/ removal would necessitate access where no roads or trails currently exist, creating a ptential for unplanned roads and landscape deterioration.	#4, #14	1. High
2. Fences might be skylined or constructed in long, straight segments near main roads.	#18, #19	2. Moderate
3. Color, materials and design used in fence construction might contrast with the natural landscape.	#17, #18, #19	3. Moderate

1/ Definitions of impact reduction ratings are as follows:

Visual Resources

High	Would meet the objectives of the Visual Resource Management Classes II and IV.
Moderate	Would not meet the objectives of Visual Resource Management Class II.
Low	Would not meet the objectives of Visual Resource Management Classes II or IV.

Recreation Resources

High	Would not result in the reduction of recreation experience.
Moderate	Would directly result in the reduction of recreation experience in terms of quality.
Low	Would directly result in the reduction of recreation experience in terms of quality and quantity.

TABLE 4-6 (Continued)

Impacts	Mitigation	Reduction Due To Mitigation
4. Form and color of cattleguards, water troughs, and windmills might contrast with the natural landscape.	#15, #28, #29	4. Moderate
5. Disturbance or rearrangement of soil and vegetation for spring, reservoir, pipeline, and livestock trail construction and for the reseeding test plots might contrast with the natural landscape.	#24, #25, #33	5. Moderate
6. Lines would be formed by fences, and changes in vegetation and soil disturbance would occur at spring developments, reservoir sites, pipelines, and livestock trails and at reseedings.	#18, #20, #24, #33	6. Moderate
7. Reseeding with only one species at reservoirs and livestock trails and with the mixture planned for the reseeding test plots might provide an unnatural appearance in the landscape.	#25, #32, #34	7. Moderate
8. Fences could be a barrier to cross-country recreation use--hunting, back country use, rockhounding, and ORV use.	#16, #21	8. Low
9. Project construction and livestock trailing could disturb or destroy petrified wood deposits.	#23	9. High
10. Service roads and trails might be necessary for facility development.	#4, #30, #31, #32	10. High

TABLE 4-7

CULTURAL RESOURCES

Impacts	Mitigation	Reduction Due To Mitigation
1. Seven archaeological sites and three districts (containing 10 sites) potentially eligible for nomination to the National Register are receiving intense livestock trampling owing to water sources in their vicinities.	#1, #2	1. Fencing will reduce impacts from trampling by 100 percent, but will produce a low impact on the sites' integrity of setting.
2. An unpredictable number of cultural sites could be disturbed or destroyed as a result of moving construction equipment across country.	#1, #3	2. 100 percent, as access routes would avoid cultural sites.
3. Two archaeological sites would be partially destroyed by earth movement for the construction of proposed reservoirs.	#1, #22	3. 100 percent, provided reservoir-site relocation proves feasible in terms of water needs. Where it is not, salvage operations can realistically provide no more than 50-75 percent mitigation.
4. Equipment access corridors might become established as back-country recreation roads, making accessible to vandals previously inaccessible cultural sites.	#4	4. 100 percent, assuming measures effectively prevent the proliferation of roads.
5. An unpredictable number of cultural sites could be disturbed or destroyed by construction of fences, pipelines, and livestock trails, and in the case of trails and fences, would be further impacted by cattle trampling.	#1, #23	5. 100 percent, providing that deflections of linear projects are feasible. Where they are not, salvage operations can realistically provide no more than 50-75 percent mitigation.

TABLE 4-7 (Continued)

Impacts	Mitigation	Reduction Due To Mitigation
6. Ten archaeological sites could be disturbed or partially destroyed by earth movement for the construction of proposed spring developments.	#1, #26	6. 90-100 percent; a small amount of unpredicted cultural deposit could be disturbed in initial probing.
7. Fifty-three predicted archaeological sites in custodial management areas could receive unidentified grazing-related impacts.	#1, #9	7. Approximately 100 percent, assuming resulting recommendations are adopted.

TABLE 4-8

LIVESTOCK GRAZING

Impacts	Mitigation	Reduction Due To Mitigation
1. Operators could not utilize maximum available livestock forage due to unbalanced use in the Treatment A and B pastures.	#12	1. Variable, depending on individual operators. If all operators were to adjust seasons of use to equalize use in the Treatment A and B pastures, 18,323 AUMs over and above existing levels may be possible, in 15 years.

TABLE 4-9

SOCIO-ECONOMIC CONDITIONS

Impacts	Mitigation	Reduction Due To Mitigation
1. Sheep operators in the Tuledad and Selic-Alaska Canyon Allotments would suffer significant economic losses in productivity which would amount to losses in excess of $90 thousand (1976 dollars).	#6	1. Unknown, depending on acceptance of the measure by sheep operators and individual operators ability to convert class of livestock.

Chapter 5

UNAVOIDABLE ADVERSE IMPACTS

Chapter 5

UNAVOIDABLE ADVERSE IMPACTS

VEGETATION

Unavoidable adverse impacts of the proposed action on vegetation would vary with livestock grazing treatment, habitat type, allotment, and time. Adverse impacts would be associated with the "use" and "seed-ripe" treatments (A and B) but would be partially counteracted by the rest provided in the grazing systems. The degree to which the adverse impacts are countered would be manifested in the rates of change in vegetation composition and forage production. Impacts are anticipated to be greatest in the initial years following proposal implementation and to decrease with time. Although range conditions might be improved considerably over the long term, livestock grazing would continue to exert an influence on vegetation.

Reduction of photosynthetic tissue by removal of green forage during the "use" and "seed-ripe" treatments would result in decreased net primary production and increased demand on stored carbohydrates, thereby decreasing vigor, root production, and competitive abilities of forage species. Reproduction of forage species would also be interfered with during the "use" treatment due to decreased production and increased consumption of reproductive organs and destruction of seedlings by grazing and trampling. Shrubs and forbs would be more severely affected than grasses.

Soil compaction due to trampling would affect vegetation primarily through reduction of water infiltration rates, restriction of normal root development, and increased difficulty of seedling emergence and establishment. Compaction of damp soil would most likely be greatest during the first month of the "use" treatment in the three-pasture grazing systems.

Inadequate rest for recovery of vigor and production of seed following heavy utilization would be provided for species such as antelope bitterbrush and quaking aspen. The degree of utilization experienced by individuals of these species would be a critical factor in their response. The majority of aspen sprouts would be expected to be consumed before growing beyond the reach of ungulates, and successful aspen reproduction would therefore not be anticipated in most aspen communities. The present downward trend in condition of the aspen habitat type would be expected to continue.

Bitterbrush responses would be anticipated to be variable. Although utilization pressure would be lessened and vigor increased, it is not known whether the effects would be sufficient to halt the apparent downward trend of most stands. Bitterbrush individuals in close proximity to livestock concentration areas would be expected to be adversely impacted. Bitterbrush reproduction would be interfered with through consumption of flowers, developing seed, and stem leader growth.

Willow regeneration would be interfered with in most willow/Nevada bluegrass communities due to repeated consumption of willow root sprouts. However, successful regeneration would be anticipated, though at a considerably retarded rate.

Inadequate rest to recover from heavy utilization would be provided for later-maturing species, such as bluebunch wheatgrass and Idaho fescue, in the two-pasture grazing system (Selic-Alaska Canyon Allotment). However, the relatively late turnout date (July 1) would alleviate this problem. Those individuals grazed before their seed-ripe growth stage would be placed at a competitive disadvantage with early-maturing species, such as Sandberg bluegrass and squirreltail. Later-maturing species are thus anticipated to be adversely affected in those areas of the Selic-Alaska Canyon Allotment first utilized by livestock.

The high degree of ungulate competition in the Tuledad Allotment would be anticipated to slow the potential rate of vegetative recovery. Greatest adverse impacts would involve quaking aspen, antelope bitterbrush and palatable forbs. Aspen reproduction would not be anticipated to be successful in the majority of aspen communities, and recovery of bitterbrush and palatable forbs would be relatively slow.

Adverse vegetative impacts are unpredictable in the custodial management allotments. Although adjustments in grazing pressure would be made as indicated by the vegetation monitoring system, adverse impacts suffered in the interim would be unavoidable.

Construction and development of livestock facilities would result in short-term disturbance by off-road-vehicle largely centering around restriction of root growth and reduction of soil water-holding capacity due to soil compaction on a relatively small scale. Disturbance due to construction would affect a total of approximately 503 acres.

The creation of additional livestock concentration areas at proposed water facilities would result in long-term unavoidable adverse impacts centering around trampling damage to herbs and loss of vigor due to inadequate rest provided for certain woody perennials, such as aspen and bitterbrush.

Reseeding tests would affect 160 acres, and the long-term vegetative impacts would depend on soil moisture conditions during the growing season of the year following seeding. If soil moisture is adequate, crested wheatgrass would dominate the herbaceous vegetation; if inadequate, cheatgrass would dominate. In either case, crown-sprouters such as rubber rabbitbrush would dominate the shrub layer and big sagebrush would recover much more slowly.

SOILS

Adverse impacts would occur during the initial grazing cycle. Although the degree of impacts would be lessened as the cycle progresses, livestock grazing would result in utilization of forage influencing soil loss, decreased available water capacity, and soil productivity.

Assuming that a vegetative-litter cover of 60 percent or more is needed to reduce soil loss to an acceptable level, use pastures in all management systems during the first cycle or two would not meet this criteria. However, mitigation measures cited in Chapter 4 (Nos. 10, 11, 12, 13, and 14) will ameliorate soil loss to within 40 to 60 percent of acceptability during this period. Beyond the second cycle, increased vegetative and litter cover accruing as a result of revegetation and only moderate grazing use (Mitigation No. 13), would provide the required protection on those habitat types having the productive capability of attaining a 60-percent or better cover (see TABLE 2-13).

Compaction of soils by grazing animals and attendant decreased permeability and water-holding capacity are related to grazing intensity as cited in Chapter 3 (Rauzi and Hanson, 1966; Gifford and Hawkins, 1975). Most significant is soil moisture content of the soil and density of ground cover which were not fully addressed in the cited studies. Since grazing on public lands is chiefly during dry seasons and soil structure is restored seasonally by freeze-thaw action on a majority of soils in the project area, these properties are exhibited annually and most significantly on bare soils. For the first two cycles, use pastures would experience some adverse impacts. Conversely, this same compacting action would assist in planting seeds for subsequent germination. Consequently, the temporary initial reduction in decreased permeability and water-holding capacity may be compensated for by the resulting increase in ground-cover density in ensuing years.

Permanent loss of soil productivity due to construction and maintenance of structures and facilities to implement the proposal is estimated at 223 acres. This acreage consists of land areas upon which physical facilities would be located to the exclusion of any other soil productive use. However, the area constitutes approximately .0004 of the total Tuledad-Home Camp Study Area and would facilitate use of previously lightly grazed areas.

WATER

Unavoidable adverse impacts on water resources reflect those described in preceding sections on vegetation and soil resources. Predominant influences of these related resources would result in parallel impacts on water resources for areas receiving systematic grazing management. On this basis it would be expected that impacts would be carried over after implementation during the first few grazing cycles. Impacts such as decreased production of forage, reduced soil permeability, increased soil compaction, and soil loss would in turn result in impacts on water resources. Reduction in vegetation production and soil compaction would increase surface runoff. Infiltration, water recharge, and overall water-holding capacity would be adversely impacted during initial implementation although the relative amount of this damage would be small.

As pointed out in the preceding mitigation chapter, those adverse impacts related to vegetation, soil, and water which would result from the proposed action would be alleviated to a large extent by mitigating measures. A small percentage of these elements (see Chapter 4, Vegetation, Soil, Water) would remain to be affected. It is difficult to predict precisely when overall improvement of range condition would reverse residual impacts on water resources but measurable improvement would be anticipated after two or three grazing cycles.

ANIMALS

Terrestrial Animals

Unavoidable adverse impacts would be: (1) nest disturbance and destruction of sage grouse, quail, ground-nesting nongame birds, and small rodents, which would occur annually, primarily in the Treatment A pastures, but also in the Treatment B pastures; (2) competition between livestock, deer, and antelope for spring and summer forage on Nevada bluegrass-sedge and willow/Nevada blueass habitat types in Treatment A pastures; (3) competition between livestock, deer, and antelope for bitterbrush forage, during late summer and fall, near water developments in Treatment B pastures; (4) reduction of residual litter for nesting cover and sage grouse, waterfowl, and nongame ground nesters in Treatment A and B pastures; (5) livestock concentrations on Nevada bluegrass-sedge, willow/Nevada bluegrass, and aspen habitat types undergoing Treatments A and B would annually reduce habitat quality by removing food and cover required by sage grouse chicks, quail, ground-feeding nongame birds, small rodents, and waterfowl; (6) long-term retardation of recovery of aspen stands, which are of particular importance to goshawks, red-tailed hawks, and certain species of woodpeckers for nesting and food supply.

Unavoidable adverse impacts due to the facilitating measures would be: (1) big-game being caught in or injured by contact with proposed fences; (2) creation of more areas of livestock competition with wildlife around proposed water developments; (3) increased competition between wild animal species not requiring free water with wild animal species anticipated to increase as a result of providing new waters; (4) destruction or displacement of small mammals, reptiles, and ground-nesting birds and their habitat on approximately 500 acres of land expected to be disturbed due to construction or land treatment.

No adverse impacts would affect threatened, endangered species.

Aquatic Animals

Unavoidable adverse impacts on the aquatic community would result from the inadequate amount of rest provided by the proposed grazing system. Livestock would concentrate along accessible segments of stream and reservoir shorelines in greater numbers than under current use. This condition would occur for two out of three years. During Treatments A and B, native grasses, rushes, sedges, and willows would be heavily utilized. Streambanks and shorelines already in poor condition from years of trampling would continue to refracture, slough, and be eroded away by peak water flows during spring runoff. This condition would continue to impact the flora and fauna in the Systematic Grazing Areas and degrade the physical, chemical, and biological water-quality values. Cold-water game fish populations would continue to decline as more marginal habitat became intolerable for future use. Species would eventually be lost or replaced by more competitive nongame species.

A total of 14.77 miles of public shoreline would be adversely impacted by the systematic grazing system, while 4.08 miles excluded from grazing would be beneficially impacted.

WILD HORSES

There would be potential for horses to collide with or become entangled in exclosure-type fences in the Tuledad Allotment (Project Nos. 12, 194, 195, and 196 in the Cottonwood pasture). Only one additional exclosure would be constructed in the Hog Mountain pasture of the Bare Allotment. The five exclosures would require about 2.25 miles of fence. Based on the small number of projects and fence required this would be a low unavoidable impact.

VISUAL RESOURCES

Regardless of how successful mitigating measures are, some modification of the basic elements of the landscape would occur.

Along fences all impacts to the line element of the landscape cannot be avoided.

Some air pollution from dust particles would result from project construction and from the trucking and trailing of livestock.

With increased vegetative production, wildfires may be more prevalent, especially in rest pastures, resulting in both air pollution and human safety hazards.

New fences may detract from the natural scene, though the design incorporates features and colors to harmonize with the surrounding environment. Long straight segments or right angles to roads would not be avoided in all instances.

Visual impacts of cattleguards cannot be entirely avoided.

Some windmills, water troughs, and reservoirs would adversely impact aesthetic values.

Failure to establish adequate groundcover after seedings could result in loss of aesthetic values.

CULTURAL RESOURCES

During the first years of implementation, archaeological sites would continue to receive impacts from the passage of cattle. The effects of trampling and erosion would gradually decrease as vegetative cover moved toward range potential, but the impacts accrued during the time intervening would be permanent. This would affect not only the known cultural resources which have been recorded but would extend to a large number of the 8,000 archaeological sites predicted to lie on the approximately 1,000 square miles which have not yet been inventoried. Unquestionably, many of these sites are eligible for nomination to the *National Register of Historic Places* and would be impacted before discovery. In certain instances, intensive trampling at unrecognized locations where cattle concentrate could totally destroy the information content of fragile sites. Any contingency salvage operations made necessary by proposed developments would involve an inevitable loss of information.

RECREATION RESOURCES

The presence of livestock and related developments in previously unused portions of the area would reduce the opportunities for recreationists seeking solitude or primitive-type experiences.

Fences would prevent unrestricted movement by ORV users and hunters. Hazards to ORV users would exist where new fences coincide with areas used by vehicles off established roads and trails.

Damage could occur to unknown or buried petrified wood deposits during construction activities.

Increased vegetative growth would somewhat hamper the activity of rockhounds by exposing less soil to view.

WILDERNESS RESOURCES

Livestock trails, windmills, fences, cattleguards, water troughs, and reservoirs might be within areas that would in future years, be proposed for wilderness area designation. If these facilities were to conflict with wilderness values and they were not removed or rehabilitated, adverse impacts would result.

LAND USES

Livestock Grazing

The primary adverse impact on livestock grazing would be the loss of AUMs resulting from: (1) The cancellation of grazing use on the Bicondoa Allotment; (2) the mitigation of reducing grazing by one-third during the first year, and; (3) the inability of ranchers to make full use of available forage production because of imbalanced seasons of use. In order to utilize available forage in the Treatment A and B pastures, an equal amount of time would have to be spent in each pasture. The seasons of use would not allow this since most use would be prior to seed-ripe. Consequently, herd size and total livestock use would be limited by the carrying capacity of the Treatment A pastures. If ranchers were to make voluntary changes in their turnout dates beyond those required by mitigation No. 10 (April 15 turnout) they would be able to utilize additional forage from their allotments. Up to 18,323 AUMs above existing levels might be utilized with much later turnout and larger herds.

Since rancher sentiments appear to indicate the ranchers oppose changes in season of use, this analysis assumes only those changes required by the mitigation. TABLE 5-1 shows that 7,430 AUMs above the present actual use would be utilized by the fifteenth year. Changes in season of use and increased forage production would result in increased herd sizes. This would require additional hay feeding on base ranches (TABLE 5-2).

Changes in seasons of use might cause decreased lamb and calf crops due to increased disease and other problems associated with calving and lambing on the feed grounds and holding livestock on private lands during the spring.

Lamb weights would be anticipated to drop slightly due to increased concentrations of livestock and additional trailing requirements.

There would be short-term weight losses and disorientation of cattle resulting from changing areas of use and established grazing habits.

The Stevensons Ranch herd size and normal yearly operation would be upset since livestock would be grazed season long on the Tuledad Allotment in place of moving to the Modoc National Forest for summer use.

Time and manpower spent for maintenance of fences and water developments and herding and caring for livestock would increase.

TABLE 5-1
LIVESTOCK USE BY ALLOTMENT

Allotment	Present Active Use (AUMS)	Livestock 1/ Use 1st Year (AUMS)	Available 4/ Forage 4th Year (AUMS)	Percent 2/ Usable	Livestock Use 4th Year (AUMS)	Available 3/ Forage 15th Year (AUMS)	Percent 2/ Usable	Livestock Use 15th Year (AUMS)	Net Change After 15 Year (AUMS)
Selic-Alaska Canyon	1,239	825	1,239	100	1,239	1,598	100	1,598	+ 359
Bare	14,968	9,967	14,968	93	13,898	22,003	93	20,463	+5,495
Denio	1,633	1,088	1,633	86	1,399	2,188	86	1,882	+ 249
Duck Lake	3,611	2,405	3,611	64	2,321	5,308	64	3,397	- 214
Home Camp	9,761	6,501	9,761	79	7,673	11,908	79	9,407	- 354
Lower Lake	698	464	698	72	500	928	72	668	- 30
Tuledad	10,947	7,284	10,947	82	8,934	15,983	82	13,106	+2,159
Wall Canyon	2,634	2,634	2,634	71	1,881	3,898	71	2,768	+ 134
Bicondoa	368	0	0	0	0	0	0	0	- 368
Custodial Allotments	366	366	366	100	366	366	100	366	0
TOTALS	46,225	31,534	45,857		38,211	64,180		53,655	+7,430

All AUM Figures include Exchange-of-Use on intermingled private land where applicable.

1/ Reflects reductions as per mitigation measures in Chapter 4.
2/ Reflects that portion of available AUMS which could be used due to limitations created by seasons of use.
3/ Source - SCS Range Site Descriptions; AUM figures are estimates, forage production may vary as much as 200-300 percent (Chapter 3, Vegetation).
4/ Source - Actual Use and Condition and Trend data.

TABLE 5-2

ADDITIONAL HAY REQUIREMENTS BY ALLOTMENT [1]

ALLOTMENT	HAY (tons)
Denio	113
Wall Canyon	212
Bare	4,604
Lower Lake	34
Duck Lake	468
Home Camp	162
Tuledad	1,303

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[1] Based on a 7,430 AUM increase in livestock forage utilization on public lands.

There might be an increase in disease due to increased livestock concentrations.

Agriculture

Expected fluctuations in either amount of livestock use or grazing seasons would have an impact on the agricultural community. Decreased use of public range land would place increased demands on home ranches for forage (TABLE 5-2). Later turnout dates would delay irrigation of meadows and hay production would decrease.

SOCIO-ECONOMIC CONDITIONS

Economic Conditions

With the implementation of mitigation measures as proposed in Chapter 4, the following impacts would be anticipated.

Change in the seasons of livestock use to later turnout dates in the spring would affect livestock revenues derived from public lands within the study area; later use by livestock would result in additional AUMs being made available. Thus, instead of an increase of 3,976 AUMs over existing levels, it would be expected that 7,430 AUMs of livestock forage would be utilized.

These increases in livestock AUMs would increase sales generated from activities in the livestock sector by an estimated $58,846 (7,430 AUM increase over existing levels × $7.92/AUM). Given a livestock multiplier factor of 1.74, additional AUMs generated by the proposal after a change in the seasons of use could thereby stimulate economic activity in the region by $102,392 ($58,846 × 1.74). Included would be an increase in household incomes of $21,773 ($58,846 × household coefficient of .37).

If the operators were to change their herd sizes (in most cases, an increase) to utilize all of the additional 7,430 AUMs, the difference between ranchers' discounted costs and revenues would fall between $750,000 and $3,400,000. The $750,000 discounted net revenue figure is a lower extreme based on a 12 percent discount rate and a maximum estimate of additional hay needed to carry the herd from December 1 until turnout on public lands (see TABLE 5-3). The $3,400,000 discounted net revenue figure excludes the specific allowance for extra hay costs and may be considered the upper extreme of discounted rancher net revenues for operation under the proposed action with mitigation for 50 years. In general, an adverse impact of the mitigation measures of Chapter 4 would be decreased rancher net revenues.

In an attempt to avoid additional hay expenses, the operators might carry smaller than maximum herd sizes or change their method of operation. The Tuledad, Bare, and Duck Lake Allotments would be most severely impacted by costs of additional hay feeding. The operators of these allotments might find it advantageous to leave a substantial quantity of available forage unconsumed. More specific estimates of profit-maximizing herd sizes cannot be provided without detailed ranch budget studies for each operation within the study area.

In addition, sheep operators in the Tuledad and Selic-Alaska Canyon Allotments would suffer economic losses as sales productivity at the 6⅛-percent interest rate would decline by about $90,000 (in 1976 dollars). This economic loss would result from the inability of sheep operators to graze over the large allotments as was once practiced; cross-fencing would force them into certain use areas. As a result, lamb weights could decline. However, even if BLM Susanville District policy were to allow sheep operators to change classes of livestock on their licenses/permits, some operators might not do so. At the 12-percent interest rate, sales productivity would decline by $37,000.

Stevensons, et al., would suffer losses in sales between the first and fifteenth year as a result of the proposal. These losses (if discounted to 1976) would range between $12,000-$23,000. After the fifteenth year, however, Stevensons herd size should be back up to approximately their present (1976) herd size.

If ranchers were to further change their seasons of use to a later turnout date consistent with the proposed action, more livestock forage would be available to them in the Systematic Grazing Area. It is estimated that as many as 118,323 AUMs over and above existing levels might be possible with a voluntary change in season of use.

Ranchers have consistently stated at public meetings that they oppose any change in season of use in the Tuledad/Home Camp Study Area. This resistance may be based on recognition that some ranchers do not presently have adequate capacity to accommodate the additional cattle and hay production necessary to utilize all of the forage available with a change in season of use. In addition to the economic reasons, the change in season of use would upset a lifestyle which is highly valued by the ranchers. Therefore, it is impossible to predict precise changes in livestock use and resultant forage increases.

Implementation of the proposal would also significantly affect the Bicondoa operation as livestock grazing would cease in the allotment to allow for the reintroduction of California bighorn sheep. As a result, this permittee would lose grazing privileges for 368 AUMs, which would decrease the value of the operation by an estimated $21,000. With regard to gross livestock sales, this termination of grazing privileges would reduce lamb sales by about $8,370 per year. In terms of 1976 dollars, these decreased sales would amount to about $70,000 (using a 12-percent discount factor). As a result, the regional economy would be indirectly impacted because of the multiplier effect; that is, the suspension of 368 AUMs of grazing would mean that the regional economy would suffer monetary losses of over $5,000 (368 AUMs × $7.92/AUM × factor of 1.74).

If herd sizes were to increase as a result of the proposal, tax revenues derived from livestock could increase by an estimated $3,050 annually, assuming that, through a change in the seasons of use, cattle numbers would increase by 937 and sheep numbers by 1,080.

Property values could also increase by some $425,000 by the fifteenth year. This figure reflects an increase in livestock forage consumption of 7,430 AUMs by the fifteenth year, continued production at that level through the fiftieth year, and discounting the value of this increase using a 12-percent interest rate.

If current tax rates on property were to remain constant during the next 15 years (25 percent market value × $8 per $100 of assessed value), approximately $8,500 in additional taxes could be generated annually by the proposal. Thus, area ranchers would annually pay about $11,500 in additional taxes as a result of the proposal.

Construction of the proposed range facilities would mean that area ranchers would have to undertake additional expenses for maintenance of Federal projects, at a time of reduced livestock prices coupled with severe drought conditions. As these maintenance costs could average a little over $24,000 annually, the proposal would adversely impact one sector (ranchers) while benefitting another (additional employment for ranch hands).

This additional labor (an estimated 96 MM) would be required to properly maintain facilities, to move livestock from pasture to pasture, etc., and would result in additional capital outlays by ranchers.

Social Characteristics

There is no discernible way to determine whether some of the ramifications of the proposal would be viewed as beneficial or adverse. It has not been determined how general attitudes relate to specific ones, how they influence or are influenced by behavior, or even how they were formed. Personal opinion about the proposal would probably be widely divergent. Interpretations of some possible attitudes are discussed below.

The proposed action would require closer supervision by the Federal government. Therefore, additional positions within certain Federal agencies might be added, particularily in the BLM and SCS. These additions to the Federal payroll could lead to resentment in the minds of the general public since: (1) the government already leads all sectors in terms of personnel employed—additions would not reduce the area's dependency upon Federal dollars to help diversify employment into other sectors; and (2) the specialized skills that would be required for these positions might lead to the hiring of out-of-area people, which would not reduce the area's high unemployment, although even if these positions were filled by area people, the resultant effects upon employment percentages would be minor.

Although impacts of fences might be mitigated so that wildlife values would not be disrupted, there might still be those who would maintain that any such intrusion would cause some adverse effect to wildlife.

Consumptive users, such as sportsmen, might also be unsure of the far-reaching implications of doubling numbers of deer and antelope in the study area. For some, these increases would seem to assure greater selectivity during the harvesting season; for others, this could lead to the attraction to the area of nonresident hunters, creating further competition for game, and possibly leading to the formation of negative impressions by both residents and nonresidents.

The proposal might induce changes in behavior in other recreational users. Off-road-vehicle enthusiasts would have their movements impeded by new division fences. Artifact collectors might discover that, as vegetation increases and active erosion is reduced, their search might become less successful. These individuals might see other advantages of the proposal but the formation of negative attitudes about the proposal would be

TABLE 5-3
DISCOUNTED RANCHER COSTS/REVENUES OF THE PROPOSED ACTION WITH MITIGATION AT 6-1/8 AND 12 PERCENT INTEREST RATES

	Discounted Rancher Costs in 1976 Terms--6-1/8% Interest Rate							Rancher Revenues		
Allotment	Improvement-Maintenance	Change in Grazing Fees[1]	Existing Level of Grazing Fees[1]	Cost of Additional Hay	Total Discounted Rancher Costs by Allotment	Changed Quantity of Livestock Forage	Discounted Livestock Production (Increased Nos.) Higher Weights[2]	Cull Cows	Existing Level of Livestock Forage	Total Discounted Rancher Revenues By Allotment
Selic-Alaska Cy.	$ 68,621	$ 4,889	$ 38,386	None	$ 111,896	$ 17,111	$- 1,261	-	$ 134,353	$ 150,203
Tuledad	105,085	5,989	339,158	$ 757,105	1,207,337	20,960	9,013[3]	$ 780	1,187,053	1,217,806
Denio	86,395	216	50,593	56,858	194,062	757	32,218	-	177,076	210,051
Bare	228,478	69,401	463,736	1,323,820	2,085,435	242,902	240,584	4,468	1,623,075	2,111,029
Duck Lake	249,562	-20,518	111,875	234,879	575,798	71,813	81,553	21,314	391,564	422,618
Lower Lake	17,812	- 3,276	21,625	16,997	53,158	11,465	11,866	5,221	75,688	81,310
Wall Canyon	37,314	- 4,817	81,606	106,271	220,374	16,860	79,763	6,363	285,621	354,887
Home Camp	167,951	-37,856	302,414	75,773	508,282	- 132,495	180,134	111,329	1,058,447	1,217,415
	$956,218	$ 14,028	$1,409,393	$2,571,703	$4,956,342	$ 49,097	$ 663,870	$149,475	$4,932,877	$5,765,319
Discounted Ranchers Costs Computed at a 12-Percent Interest Rate										
Selic-Alaska Cy.	$ 35,751	$ 903	$ 20,579	None	$ 57,233	$ 3,162	$- 515	-	$ 72,025	$ 75,672
Tuledad	73,038	-12,346	181,819	$ 220,027	462,538	- 43,212	3,684[4]	359	636,365	597,196
Denio	46,875	- 1,855	27,122	15,208	87,350	- 6,492	13,169	-	94,929	101,606
Bare	122,491	10,827	248,603	436,926	818,847	37,894	98,336	2,054	870,112	1,008,396
Duck Lake	135,743	-14,319	59,975	62,822	244,221	- 50,115	33,334	9,799	209.913	202,931
Lower Lake	11,776	- 2,342	21,625	4,546	35,605	- 8,197	4,850	2,400	40,576	39,629
Wall Canyon	20,886	- 4,375	43,748	28,424	88,683	- 15,312	32,602	2,925	153,118	173,333
Home Camp	96,815	-25,649	162,120	19,322	252,608	- 89,771	73,628	51,185	567,421	602,463
	$543,375	$-49,156	$765,591	$ 787,275	$2,047,085	$- 172,043	$ 259,088	$ 68,722	$2,644,459	$2,800,226

[1] Assuming a charge of $2 per AUM per year.

[2] Net changes from existing levels of revenue for this alternative at a 6-1/8 percent interest rate are: $923,107 for cattle and $-90,665 for sheep. At a 12-percent interest rate, the net change is: $192,825 for cattle and $-37,058 for sheep.

[3] Includes cheep losses of $89,404.

[4] Includes sheep losses of $36,543.

Source: Benefit/Cost Analysis, BLM Susanville District 1977.

just as likely. Similar perceptions could be espoused by hikers, sight-seers, and photographers. Some might support the proposal on the grounds that plant species diversity and increased quantity of forage would increase aesthetic values of the area; others might argue that the impacts of 130 miles of fence and over 100 water developments could never be effectively disguised or hidden in the general landscape, regardless of the mitigation measures practiced.

The construction of 130 miles of fence might also be greeted with skepticism by wild horse protection groups. For these individuals, wild horses project the image of "wild, unimpeded, free-roaming creatures." Even with proper mitigation measures, negative attitudes about fences in or near horse ranges could remain prevalent, i.e., application of mitigation measures might never displace the individual's perception that any fence encroaches upon a horse's freedom of movement, to a certain extent, as well as increases the likelihood of injury.

Certain unavoidable social impacts might also occur to the area ranchers.

Individuals operating the Bicondoa Allotment would be placed in a very precarious position, socially and financially. While other area permittees would be allowed to continue grazing Federal lands under the proposal at least into the foreseeable future, regardless of the profitability of business transactions, such a prerogative would not be open to Bicondoa. Therefore, it would be expected that those individuals involved in the Bicondoa Allotment would harbor very negative feelings about implementation of the proposal. Each area permittee realizes that he also faces the possibility of herd reductions or complete closure to grazing where necessary to achieve the multiple-use goals specified in Chapter 1. Therefore, negative feelings about the proposal might be held by individuals other than Bicondoa Allotment permittees.

In addition, it is anticipated that sheep operators would not do well under the proposed grazing system. Change of livestock class would be allowed but, for the typical sheepman, such sweeping changes could lead to unanticipated results. If the entire ranch operation revolves around a specific class of livestock, the owner's background, experience, and knowledge are superimposed on that class. It would be unlikely that a long-time sheep operator would welcome a change in his lifestyle; those remaining in sheep ranching might hold negative feelings about the proposal since it would apparently hurt them financially but would leave them little recourse.

The proposal might also give rise to negative feelings about one's "self destiny." Under implementation of the proposal, ranchers would have to adjust to greater BLM greater control over their operations. For some, even though economic benefits might be achieved, this loss of self determinism might be irreconcilable. Lack of control might also influence a rancher's receptivity to maintain proposed facilities after construction of the facilities, maintenance responsibilities would be assumed by the permittees.

Group alienation might also result from the proposal. Some individuals might benefit from implementation but others who would not might seek support in their attempts to prevent implementation. Such support could be the result of peer group pressures, fear of ostracism from the community, etc. A permittee could hold both positive and negative feelings about the proposal: positive, if it will help the individual, negative if the proposed grazing management is superimposed on those who neither desire the plan nor would benefit from it. It is likely that the operators would recognize that each of them would be subject to having grazing privileges further reduced or terminated if the grazing system, as proposed, failed to meet its objectives.

Chapter 6

RELATIONSHIP BETWEEN LOCAL SHORT-TERM USE AND MAINTENANCE AND ENHANCEMENT OF LONG-TERM PRODUCTIVITY

Chapter 6

RELATIONSHIP BETWEEN LOCAL SHORT-TERM USES OF MAN'S ENVIRONMENT AND MAINTENANCE AND ENHANCEMENT OF LONG-TERM PRODUCTIVITY

For the purposes of this analysis, "short-term" refers to 15 years. Although all objectives may not be completely reached until later years, trends should be stabilized by this time. "Long-term" refers to the period of time beyond 15 years in which impacts would still occur as a result of the proposal.

VEGETATION

Improvement in range conditions within 15 years following implementation of the proposed action would result in an increased livestock forage production range from 70 million to 200 million pounds per year to 110 million to 267 million pounds per year for the systematic grazing management area. Long-term productivity would be increased to 165 million to 380 million pounds per year when range conditions are restored to "excellent." Vegetation diversity, both between and within communities, would also increase as range conditions improve.

Short-term vegetative production would be reduced in the immediate area of construction and by the use of facilities required to implement the proposal. Lost production is not quantifiable. This loss would be offset in the long term as range conditions improve toward site potential.

SOILS

Initial adverse impacts on soils during the early years of implementation of the proposal would be indiscernable in terms of measurable soil productivity after several decades. Present trend studies indicate an improving condition in most areas, indicative of soil capability to restore fertility and productivity following abuses. Anticipated increases in vegetative cover and litter resulting during the 15-year period would further demonstrate soil capability.

Beyond the 15-year period, stabilization of productivity with proper management could be achieved to a degree somewhat below that attainable under pristine conditions.

WATER

In the short term, some adverse impacts would affect water availability and quality, surface runoff, interflow, recharge, and evaporation losses. However, once the proposed grazing systems have been stabilized through adjustment, monitoring, and project development these short-term affects would be reversed. Therefore, in relation to long-term productivity the grazing allotments would increase their productivity and allow for more beneficial use and improved condition of water resources.

ANIMALS

Terrestrial Animals

Deer and antelope productivity would be reduced as a result of the first year of the proposed action but would increase and reach population goals during the short term. By MFP decision, forage increases will first be alloted to meet wildlife needs.

Destruction and displacement of small animals and their habitats would occur during construction activities. Within a few years destroyed animals would be replaced and habitats reoccupied. This would occur within the short term.

A continuing impact would be the loss of deer and antelope, at the rate of five or less per year, through accidents with fences. Fences would be designed to minimize this impact but some loss would be inevitable. This loss would be offset by the increase in animal numbers made possible by increased carrying capacity resulting from systematic livestock grazing.

Aquatic Animals

Toward the end of the 15-year period, fisheries habitat condition in the study area would improve with the stabilization of riparian areas and increased vegetative cover in the surrounding uplands. However, there would be some initial effects on 6.18 miles of streams due to grazing during the first few cycles. These effects would result in adverse impacts with regard to stream ecosystem components such as surrounding vegetation, soil, and the aquatic community. Habitat conditions on accessible stream segments would be expected to decline during the first years of implementation but this trend would stabilize and move upward by the end of the second cycle (six years), reaching significant improvement by the end of 15 years. This is assuming normal precipitation.

Short-term impacts on reservoirs would follow similar trends. However, there would be some increased productivity of impoundment fisheries due to proposed water development projects.

The long-term productivity of fish-producing streams and reservoirs would be expected to result in less sedimentation of lake- and streambeds, increases in streambank vegetation, lower water temperatures, and overall improvement of aquatic ecosystems.

WILD HORSES

Initially, there would be increased competition for forage between horses and livestock, but after several cycles of the grazing treatments the vegetation should increase in condition and productivity, thus reducing competition. The total population of horses would not be affected since it will be managed in accordance with MFP decisions and the Wild Horse and Burro Management Plan.

VISUAL RESOURCES

The grazing management program and proposed range facilities would disrupt aesthetic values over the short-term due to soil and vegetation disturbance and to the contrasts that would develop between rest and use pastures.

Over the long-term, soil and vegetative conditions would improve and diminish short-term intrusions. Any permanent scarring of the soil and rock would be difficult to rehabilitate and would be visible for years. Facilities not designed in harmony with the natural landscape would present long-term impacts throughout the life of the projects.

CULTURAL RESOURCES

The first years following implementation of the proposed action would see both a continuing slight erosion of the cultural resource base as well as a substantive increase in knowledge of the area's history and prehistory (especially with regard to site distribution and intersite variability), resulting from mitigation-related inventory and monitoring. By the end of the 15 years the trend toward range potential should be realized with a resulting decrease in erosion throughout the area and a concomitant stabilization of the chief factors currently impacting archaeological sites. Beyond 15 years, it is projected that the intensity of impacts on cultural resources would be significantly reduced by implementation of the proposed action, though the degree of improvement would be a function of the rate at which vegetation actually responded favorably to the grazing system. The inventory and monitoring program would further enhance long-term productivity; each year more sites would become known and more appropriate, specific measures could be designed to ensure optimum management of them.

RECREATION RESOURCES

Over the short term, there would be disruption of recreation uses due to project facilities and livestock movements and concentrations. Opportunities to hunt or view wildlife might be temporarily lost by the disruption of animals during project development.

Improvements in soil and vegetative conditions would benefit the majority of recreation uses over the long term. Permanent structures could, for the life of such structures, affect the integrity of primitive-type values and experiences and also hinder the free movement of recreationists.

WILDERNESS RESOURCES

Short-term impacts cannot be identified as neither specific guidance related to wilderness review and designation nor the location of specific wilderness study areas have been identified. Over the long term, if project development is found to be incompatible with wilderness designation, and removal or rehabilitation would still not provide compatibility, a long-term adverse impact would result, prohibiting wilderness area designation.

LAND USES

Livestock Grazing and Agriculture

Under the proposed action, some livestock operations would experience a reduction in livestock use which might result in reduced range-related income over the short term. Livestock weights might decrease during the first few years, which could also result in reduced range-related income initially. Long-term benefits would be directly related to anticipated increases in quantity and quality of desirable livestock forage.

SOCIO-ECONOMIC CONDITIONS

Economic Conditions

Implementation of the proposal with mitigation would result in a short-term decrease and a long-term increase in livestock forage utilization. Livestock forage utilization would reach its low point in the first year with 14,691 AUMs less than are currently authorized. It would increase in the long-run, reaching 7,430 AUMs above current levels. Potentially, the increase could be as much as 18,323 AUMs if all of the ranchers were to choose to make greater changes in their season of use.

Part of these changes would be a short-term and long-term decline in sheep productivity in the Systematic Grazing Management Area. This would result from constraints placed on the Tuledad and Selic-Alaska Canyon operators, and termination of grazing privileges on the Bicondoa Allotment.

Cattle production would increase enough in the long term so that total livestock production would increase.

Social Characteristics

Under implementation, area ranchers would lose some control over their operations, for example, the grazing systems could not be broken without Federal permission. Therefore, a permittee might harbor negative feelings in the short term because he would have to make large capital expenditures to construct range facilities and increased revenues from livestock during this time might be negligible.

In the long term, area permittees would experience a sense of loss in self determinism. Additionally, many area permittees might resent their inability to utilize the additional forage that would be produced. Therefore, the long- and short-term impacts might be the same: government intervention.

Chapter 7

IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

Chapter 7

IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

Only resources which are affected to the point of being irreversible and irretrievable will be discussed.

The following terms and their definitions are to be noted in the review of this chapter:

Irreversible—incapable of being reversed; once initiated, use would continue.

Irretrievable—not recoverable; once used, not replaceable.

Given the above definitions and preceding assessments of resource impacts, mitigation measures, and unavoidable impacts, certain resources would experience losses. Perhaps the common denominator in such losses as defined above relate to soil, water, and ultimately vegetation. These resources would experience irretrievable losses due to construction of facilities but no irreversible losses inasmuch as all proposed facility development could be reclaimed and rehabilitated. Impacts resulting from reseeding tests are reversible and retrievable. Portions of habitat types with downward trends not reversed by the proposal might constitute irretrievable losses. It should also be noted that although minimal loss of vegetation would result from construction, expected increases and benefits would exceed short-term losses.

This same relationship would hold for affected recreation and visual resources, with the exception that, once short-term experiences were impacted, the quality of some recreational experiences would be irretrievable. For example, disturbance or displacement of wildlife could result in irretrievable loss to sportsmen although long-term benefits would reverse this effect. Cultural resources, however, would suffer from both irreversible and irretrievable losses where the unanticipated hazards of soil erosion during facility construction or livestock trampling would result in the disturbance of cultural configuration. Such impacts would result in an irreversible and irretrievable loss of cultural information necessary to reconstruct past history.

Sheep operations in the area would experience decreased lamb sales. The discounted value of this foregone production would be approximately $90,000. This decrease would not be irreversible, but any sheep production foregone would be irretrievable.

For the Stevensons' operation, there might be reduced cattle production during the anticipated 15-year full-implementation process. This loss could range between $12,000-$23,000. However, total cattle production within the region would not decrease if Stevensons sold their U.S. Forest Service permit to another livestock operator.

The proposal would also involve the commitment of materials associated with the installation of range facilities. Once installed, these materials would be irretrievably committed, although certain materials might have some salvage value. The use of human resources for the implementation and maintenance of these facilities would not be recoverable, however.

Chapter 8

ALTERNATIVES TO THE PROPOSED ACTION

Chapter 8

ALTERNATIVES TO THE PROPOSED ACTION

INTRODUCTION

Five alternatives to the proposed action are addressed: (1) Continue Present Management (No Action); (2) No Grazing; (3) Proposed Action with Reductions; (4) Variety of Grazing Systems; (5) Combination of Existing Allotments.

Where references to Chapter 3 appear, they are not intended as a comparison of the Alternative with the proposed action but rather as a description of the potential impacts with reference to the existing situation.

In addition to the above mentioned alternatives, custodial management of the eight allotments was considered. This alternative will not be analyzed because it is not considered a viable alternative.

Custodial management in the Denio, Lower Lake, Duck Lake, Home Camp, Selic-Alaska Canyon, and Tuledad Allotments would consist of continuous season-long grazing at the discretion of the licensee. The Bureau's role in the management would be regulation numbers of livestock and season of use.

Custodial management in the Wall Canyon and Bare Allotments would mean cancellation of the existing Allotment Management Plans (AMPs). Management would revert to the licensees as in the previous group of allotments. The Bureau's role would be that of regulation of numbers of livestock and season of use.

Under custodial management, construction and maintenance of range facilities would be performed as necessary. Management of other resources such as timber, wildlife, minerals, and recreation would continue at existing levels of use. Custodial management and the associated continuous grazing have been applied on public lands and have been found inadequate. Range deterioration on many critical habitat types has occurred and would continue to occur under this management.

ALTERNATIVE 1—CONTINUE PRESENT MANAGEMENT (NO ACTION)

Grazing Management Proposal

This alternative proposes that grazing be managed as it is presently with no change in pattern of livestock use, class of livestock, or season of use. In essence, no action would be taken to change management of livestock as it is presently.

Wild horses would be managed at the stated Management Framework Plan (MFP) level: 50 horses in the Fox-Hog Mountain Herd Management Area, and 100 horses in the Tuledad Herd Management Area.

Management and use supervision would be handled with existing personnel.

GRAZING TREATMENTS AND FORMULAS

There are currently 10 allotments within the Tuledad/Home Camp Planning Units as follows:

Denio
Wall Canyon
Bare
Lower Lake
Duck Lake
Home Camp
Selic
Alaska Canyon
Tuledad
Bicondoa

There are existing AMPs established on the Wall Canyon and Bare Allotments and they would continue to be applied.

The Wall Canyon Allotment is currently being operated under a three-pasture deferred-rotation grazing system (FIGURE 8-1). FIGURE 8-2 displays the grazing formula and yearly grazing schedule for each pasture.

During the first and second years pasture II would be rested until seedripe time of Thurber needlegrass (normally mid-July) for seed production, seedling establishment, and increased vigor of the native perennial species. Likewise, pasture III would be rested during the third and fourth years, and pasture I, the seeded pasture, would be rested during the fifth and sixth years. The sequence would then be repeated.

The Bare Allotment is currently being operated under a five-pasture rest-rotation grazing system (FIGURE 8-1). FIGURE 8-3 displays the grazing formula and yearly grazing use for each pasture. Pastures I and V would be grazed alternately from April 1 to April 30 on a two-year cycle. Pastures II, III, and IV would be grazed from May 1 to October 30 under the same three-treatment grazing formula described in Chapter 1.

The Bicondoa Allotment is presently grazed from December 15 to February 15 each year with sheep. The remaining allotments are currently grazed during the spring, summer, and fall months each year.

In the past, attempts have been made to establish proper range use in the Tuledad and Home Camp Planning Units as evidenced by a series of reductions since livestock began grazing the area. Overall range conditions have stablilized

FIGURE 8-1

Wall Canyon and Bare Allotments

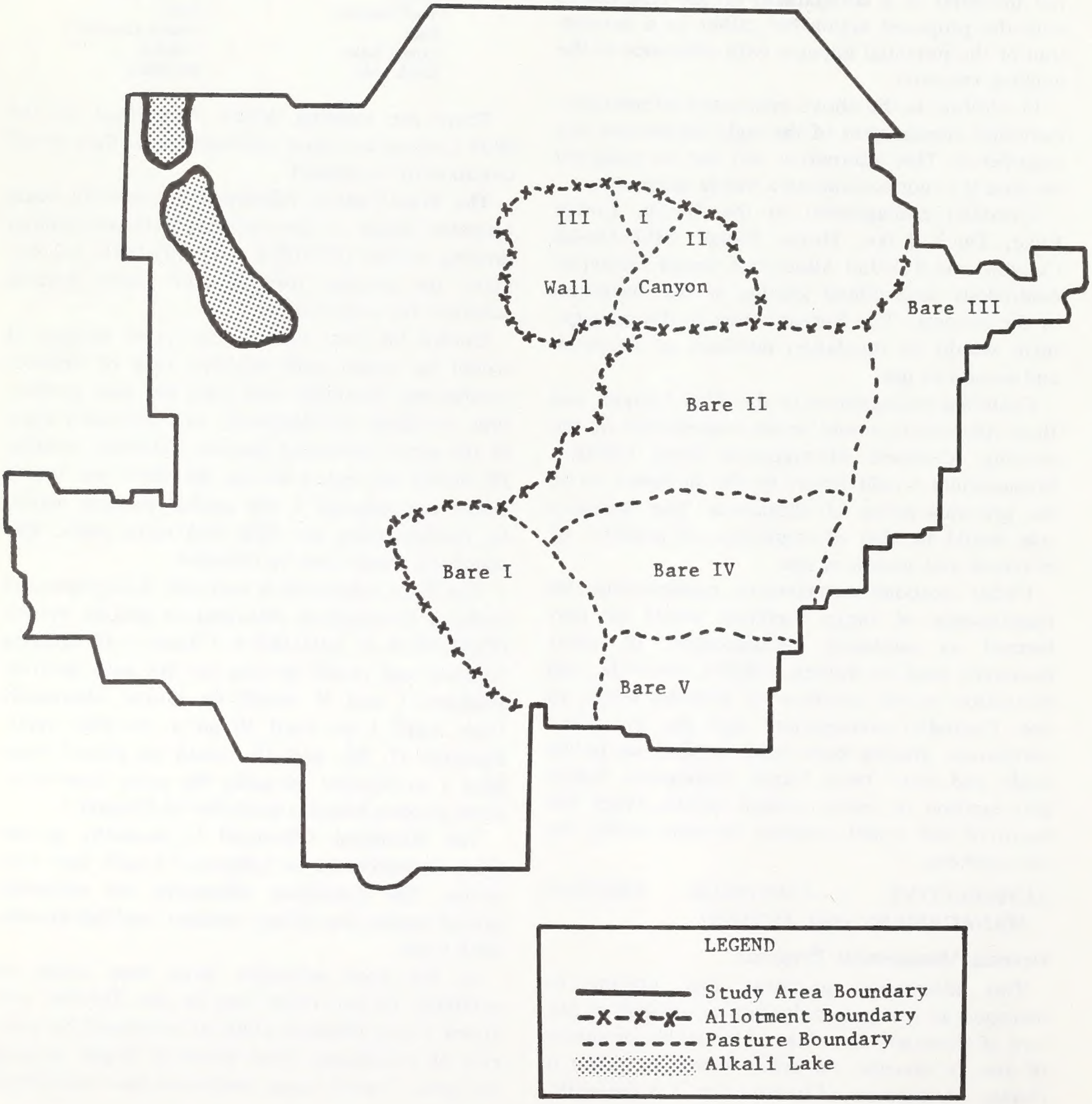
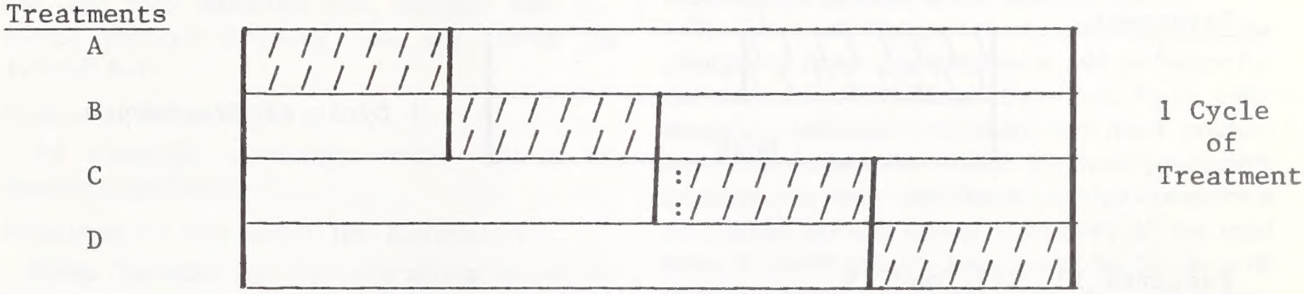


FIGURE 8-2
GRAZING FORMULA AND YEARLY GRAZING SCHEDULE
FOR WALL CANYON ALLOTMENT

Grazing Formula



▨ Graze

☐ Rest

⁞ Seedripe date of selected forage species.

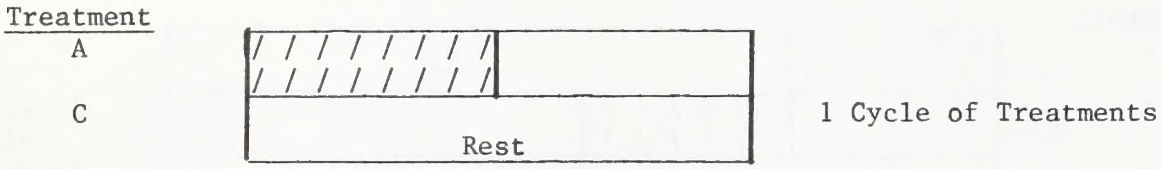
Yearly Grazing Schedule

	Treatments		
Year	Pasture I	Pasture II	Pasture III
First	A, D	C	B
Second	B, D	C	A
Third	A, D	B	C
Fourth	B, D	A	C
Fifth	C, D	B	A
Sixth	C, D	A	B
Seventh	Repeat sequence of treatments.		

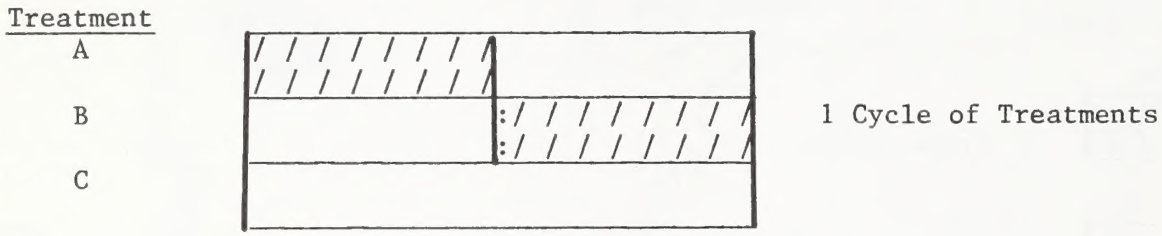
FIGURE 8-3
GRAZING FORMULA AND YEARLY GRAZING SCHEDULE
FOR BARE ALLOTMENT

Grazing Formula

Pastures I and V



Pastures II, III, and IV



▨ Graze

☐ Rest

⁝ Seedript date of selected Forage species.

Yearly Grazing Schedule

Treatments

Year	Pasture I	Pasture II	Pasture III	Pasture IV	Pasture V
First	A	A	B	C	C
Second	C	B	C	A	A
Third	Repeat Sequence	C	A	B	Repeat Sequence
Fourth	Repeat sequence of treatments.				

but livestock concentration areas and poor range conditions still prevail on key wildlife habitat areas, i.e., meadows, riparian areas, waterfowl habitat, and antelope rearing areas. Projecting past management trends, it is assumed that further livestock reductions would be imposed in an attempt to achieve satisfactory range conditions on these areas with the exception of the Wall Canyon Allotment. A 25-percent reduction in current livestock use is projected to occur over a 20-year period. The class of livestock, season of use, and total allowable use, together with expected reduced livestock use, are shown on TABLE 8-1.

CUSTODIAL MANAGEMENT

All custodial allotments would remain as described in Chapter 1.

FACILITIES TO IMPLEMENT THE ALTERNATIVE

Range facilities for this alternative would be limited to spring developments described in Chapter 1 and other facilities described specifically for the Wall Canyon and Bare Allotments. Existing facilities would be maintained.

Impacts of Alternative 1

VEGETATION

The one year and short-term impacts on vegetation would be essentially as described for the existing condition for vegetation in Chapter 2.

However, under continuation of present management, the vegetation of the Tuledad/Home Camp Study Area would exhibit some very noticeable changes over the long term. The major portion of the land area, however, would remain unchanged. The noticeable differences would occur in the aspen, willow/Nevada bluegrass, and Nevada bluegrass-sedge habitat types.

Most aspen communities are presently mature. Aspen is not a long-lived species, and existing stands would be expected to show marked signs of deterioration within the next 15 years. At the present time, many aspen stands have already died and have been replaced with big sagebrush-dominated communities. This situation would become more widespread and would progress at a faster rate as existing trees become overmature. Aspen reproduce vegetatively; seedling success is extremely poor. Thus, chances for aspen reestablishment, once the clones have been eliminated, would be remote.

The willow/Nevada bluegrass communities have suffered tremendous deterioration in the past, are presently restricted to a very few locations and would possibly be eliminated within 15 years. The communities would then exist in a silver sage-big sage/sedge stage of retrogression.

The Nevada bluegrass-sedge habitat type would be reduced to a "poor" condition classification, as headcutting continued to lower water tables and shrubs invaded these communities. Some areas of this habitat type would no longer be recognizable as such to the casual observer.

The loss of forage production due to the changes in these communities would be minor for the study area considered as a whole. These communities, although potentially the most productive, are already of much lowered productive capacity and even considered together comprise a very small portion (about 1 percent) of the total area. A much greater loss would be the loss of their productive potentials and the tremendous reduction of biotic diversity. The "islands" of the shrub-steppe would be gone.

The 25-percent reduction in livestock AUMs anticipated to result from public pressure stemming from loss of the above habitat types would have very little, if any, effect on their rates of deterioration but would have the effect of lessening grazing pressure on the higher and less accessible areas of range presently being used. Thus, some increase in forage production would be anticipated in these areas which vary more with topographic irregularities and proximity to water than with habitat type, but the increased forage would not be used by livestock.

SOILS

Under existing management, the soils of Habitat Types (HT) 1, 5, 7, 19, 25, 26, and 28 would be the only ones to maintain a vegetative-litter cover of at least 60 percent over the long term. The soils of these habitat types are phases of the Karlo, Disabel, Jesse Camp, Coutcher, McConnel, Hapgood, Newlands, Home Camp, Snag, Bluebell, Foxmount, Tourn, and Waca series. They comprise 32 percent of the study area. The soils of the remaining habitat types would not be expected to attain the "threshold" percentage of 60 over either the short or the long term.

Long-term impacts on the soils of HT-13, 26, and 27 would be greatest under existing management due primarily to expected changes in vegeta-

TABLE 8-1
ALTERNATIVE 1 - LIVESTOCK USE

ALLOTMENT[1/]	SEASON OF USE		CURRENT LIVESTOCK USE (AUMs)[2/]	PROJECTED LIVESTOCK USE AFTER 20 YEARS (AUMs)[2/]	GRAZING SYSTEM
Denio	04/16-10/15	Cattle	1,633	1,225	Season Long
Wall Canyon	04/16-09/15	Cattle	2,634	2,634	Existing AMP (Deferred Rotation)
Bare	04/01-10/31	Cattle	14,968	11,226	Existing AMP (Rest Rotation)
Lower Lake	03/16-08/15	Cattle	698	523	Season Long
Duck Lake	04/01-09/15	Cattle	3,611	2,708	Season Long
Home Camp	04/01-09/15	Cattle	9,761	7,321	Season Long
Selic	07/01-09/30	Sheep	591	443	Season Long
Alaska Canyon	07/01-09/30	Cattle	648	486	Season Long
Tuledad	04/01-12/15	Sheep/Cattle	10,947	8,210	Season Long
Bicondoa	12/15-02/15	Sheep	368	276	
			45,859	35,052	

[1/] Custodial allotments would remain as described in Chapter 1. Reductions are assumed to occur on a straight line basis from 1978 to 1998.

[2/] AUM figures include exchange of use. Derived from the SCS Range Survey, 1961.

tive cover. The soils of HT-13 (phases of Buntingville, Campone, Husser, and Welch series) presently have 60 percent or greater vegetative-litter cover; the vegetation would be reduced to a "poor" condition classification due to continual accelerated erosion. Accelerated erosion would produce significant moisture regime changes in these soils over the long term. Lowered water tables would result in vegetative conversion. The long-term impacts upon erosion, sediment yield, vegetative cover, surface permeability and runoff would be high for the soils of HT-13.

The Hapgood soils of HT-26 presently have a 60-percent cover of vegetation-litter. Expected vegetative conversion due to deterioration of aspen stands within the next 15 years would cause moderate impacts upon erosion, sediment yield, cover, runoff, and surface permeability of the soils.

No vegetative-litter cover data are available for the Cummings Muck, clay subsoil variant soil of HT-27. However, expected vegetative conversions of the habitat type would adversely affect the soil moisture regime of this soil. Changes to a drier soil moisture regime would result in high impacts upon soil erosion, sediment yield, cover, runoff, and permeability largely due to effects of compaction and trampling by animals.

WATER RESOURCES

Season-long grazing would cause frequent defoliation of vegetation throughout the entire growing season resulting in over-utilization of the important plant species, particularly on meadows. This type of grazing generally does not allow for increases in ground cover due to a continual lack of vegetative growth and litter. This system encourages growth of taprooted plants such as sagebrush rather than fibrous-rooted grasses.

Additionally, the expected reduction in livestock use of 25 percent in 20 years would not alleviate the impact described above. The sensitive areas, areas favored by livestock, and important plants would not be given relief. These impacts on vegetation would be expected to result in adverse impacts on water resources. The current hydrologic conditions as described in Chapter 2 would change very little, particularly in those areas heavily used by livestock. Water quality and consumptive use of water would remain unchanged.

Continued deferred rotational grazing in the Wall Canyon Allotment along with expected vegetation impacts would result in adverse impacts on water. Overall, watershed condition would be less desirable than in the three- or four-pasture grazing systems but slightly better than other allotments which would have season-long grazing. In comparison with other allotments, Wall Canyon would have a moderate decrease in bare ground and fibrous-rooted plants would experience modest increases. Therefore, surface runoff would be somewhat reduced compared to continuously grazed allotments. Likewise, water infiltration could be expected to increase slightly.

In the Bare Allotment, the five-pasture rest-rotation grazing system would have the same impact on pastures II, III, and IV as the proposed action (Chapter 3). Pastures I and V would be grazed in April every other year. Early spring grazing causes maximum disturbance to bare ground and existing vegetation before being rested the remainder of the growing season. Total ground cover would be expected to increase but slowly. Annual grasses and forbs rather than perennial fibrous rooted grasses would be favored. Sagebrush would be reduced, which would alleviate evapotranspiration losses and contribute to a slight increase in water interflow. This added efficiency moisture use would be expected to stimulate vegetative growth. Changes would be slow and related to the intensity of grazing during the use period.

Surface runoff would be expected to decrease. Interflowing water, water infiltration rates, and water quality would be expected to improve over continuously grazed areas. The consumptive use of water would remain unchanged.

Winter grazing in the Bicondoa Allotment by sheep would favor the growth of fibrous-rooted grasses and tend to reduce sagebrush, creating ideal plant cover to effectively control surface runoff and increase interflowing waters. However, in this case, steep topography and shallow soil mantles have limited capacity to accept or hold soil moisture. As a result, the net effect would be a moderate increase in surface runoff primarily caused by reduced total vegetative cover. The taprooted plants (sagebrush, bitterbrush, etc.) would be more heavily grazed because of selective grazing by sheep.

ANIMALS

Terrestrial Animals

Under present management, wildlife habitat would continue to deteriorate in spite of livestock reductions but the response of populations would be variable. Impacts of water developments and other facilities would be the same as those described in Chapter 3.

MULE DEER

In the continuous grazing areas, deer habitat would be expected to continue to deteriorate and forage competition with livestock would continue except in areas far from water or of rough topography. Short-term competition would remain severe between deer and livestock for bitterbrush and spring forbs and grasses. Impacts expected would be continued poor fawn survival and some winter adult loss and essentially no change in the population. In the long-term, decadent bitterbrush stands would continue to die without replacement, mature bitterbrush plants would continue to decline in vigor, HT-13, 26, and 27 (bluegrass-sedge, aspen, and willow/bluegrass) would exhibit major deterioration and loss, and deer habitat quality would be poor. Deer populations would respond in a downward manner by the end of 15 years.

In the Wall Canyon and Bare Allotments, the impacts on deer would be expected to be the same as described in Chapter 3.

PRONGHORN ANTELOPE

In the continuous grazing areas, antelope habitat would be expected to continue to deteriorate and antelope-livestock competition would be expected to remain strong except in areas far from water or in rough topography.

In the short term, heavy use of grasses and forbs at greenup would leave little forage for antelope during the late prenatal period when an adequate diet is essential. Even with the expected 25-percent livestock reduction, livestock use would remain heavy on HT-13, 23, and 27 where succulent forage and water are found in close proximity on relatively flat terrain. Competition for bitterbrush would also be strong. Poor fawn survival and thus poor recruitment to the herd, which would hold the population at current numbers, would be the short-term impact of continuous grazing. In the long-term, the deterioration of HT-13 and 27 would decrease the amount of succulent, high-protein forage available in antelope habitat. At the end of 15 years, habitat deterioration would not have progressed to the point where the population would decline but population increases would not be expected.

In the Wall Canyon and Bare Allotments, the impacts on antelope would be expected to be the same as described in Chapter 3.

SAGE GROUSE

Competition for food and cover on the meadows of HT-13 and 27 and nest disturbance and destruction caused by continuous grazing of livestock would continue to inhibit sage grouse productivity. Short-term change in bird populations would be little if any. In the long-term, gradual deterioration of HT-13 and 27 would slowly decrease the habitat carrying capacity for sage grouse and populations would be expected to slowly decline.

Impacts expected on sage grouse in the Wall Canyon and Bare Allotments would be the same as those outlined for systematic grazing management in Chapter 3.

QUAIL

Continuous livestock grazing in HT-27 (willow/Nevada bluegrass) would inhibit the growth of shrubs required for quail cover. Short-term impacts expected would perpetuate very small, geographically restricted quail populations. In the long-term, HT-27 would be expected to continue to decline, which would just about eliminate quail habitat. The quail population would decline and possibly be eliminated after 15 years.

WATERFOWL

It is assumed that waterfowl habitat management planning would continue at its present pace; within 15 years the limited amount of waterfowl habitat within the study area would be protected in some manner if it were being subjected to heavy grazing.

Because waterfowl habitat in the study area is limited (2,400 acres) and continuous grazing is extremely detrimental to waterfowl production, it is believed that waterfowl habitat protection would be implemented within 15 years. Therefore, this grazing alternative would have no impact on waterfowl habitat.

NONGAME SPECIES

Continuous grazing would be expected to have adverse impacts on nongame species. Continued disturbance of ground-nesting birds and surface nesting rodents would continue lower-than-optimum reproductive success of these species. Removal of herbaceous vegetation by livestock has reduced food and cover for nongame species, which has also reduced the habitat carrying capacity and increased vulnerability to predation. In the short term, nongame animal populations would be expected to remain near current levels. In the long term, continuous livestock grazing would continue to cause the decline and destruction of HT-13, 26, and 27 (meadows, aspen, and willow riparian areas) which are critical to the interspersion of habitats which makes species diversity possible. Over 150 of 305 species of vertebrates inhabiting the study area make use of HT-13, 26, and 27, which make up less than 1 percent of the study area. After 15 more years of continuous grazing, nongame species would be expected to decrease, with the greatest decreases being in those species inhabiting HT-13, 26, and 27.

Impacts expected on nongame species in the Wall Canyon and Bare Allotments would be the same as those outlined for systematic grazing management in Chapter 3.

THREATENED OR ENDANGERED SPECIES

The continuation of domestic sheep grazing in the Hays Canyon area would preclude Nevada Department of Fish and Game reintroduction of California bighorn sheep.

Aquatic Animals

With the intensity of livestock use in the Tuledad, Duck Lake, Wall Canyon and Selic-Alaska Canyon Allotments remaining, for the most part, consistent with 1976 levels, no change in the downward trend of stream conditions would be anticipated. Heavy livestock concentrations on all eight perennial streams would result in excessive consumption and trampling of streambank flora from April 1 to October 15 of each year. This alternative would adversely impact 16.25 miles of public streamside.

The short-term impact of this alternative would be the continuing decline of trout cover, living space, food, and reproductive capabilities. The long-term impact would be the loss of cold-water fisheries.

WILD HORSES

Facilities to implement the alternative would be limited to the spring developments listed in the proposed action for the Tuledad Allotment and all the projects described for the Bare Allotment. These projects are listed in Chapter 3 in TABLE 3-13. The short-term impacts under this alternative would be the same as discussed with reference to fencing in Chapter 3, Wild Horses.

In the long-term the overall range condition would remain unchanged under the alternative, except for certain areas of great concentrations of livestock where the range condition would deteriorate to "poor." The overall loss of forage production would be minimal; it would be expected that the wild horses would continue to maintain themselves in good condition. A reduction in livestock numbers would reduce competition for forage, which would be beneficial for wild horses.

VISUAL RESOURCES

Continuation of present management would cause no new impacts on visual resources beyond those which have already occurred. Visual resources would be adversely impacted due to forage depletion in areas of heavy grazing. Trampling and vegetation removal caused by livestock concentrations would continue.

CULTURAL RESOURCES

Continuation of present management would result in continuation of adverse impacts on cultural resources throughout the study area. Each of the impacts identified qualitatively in Chapter 3 would be realized, but their quantitative and cumulative effects would be conditioned by factors specific to this alternative.

As all allotments would be open to grazing (including Bicondoa and the western margin of Lower Lake), all open sites regardless of category would fall within the zone of potential impacts from diffuse livestock trampling in the short term (first grazing cycle). A predicted 7,649 open sites could be thus affected in the following allotment distributions:

Denio—311
Wall Canyon—500
Bare—2,588
Lower Lake—162
Duck Lake—748
Home Camp—1,931
Selic-Alaska—60
Tuledad—1,265
Bicondoa—84

Further, 138 known archaeological sites, including 10 *National Register* eligible properties, occur at locations where livestock congregate and would continue to receive more intense trampling than the majority of sites (see TABLE 8-2 for site types and allotment distributions).

The projected 25-percent reduction in livestock use over the next 20 years would reduce the intensity of trampling, though by a factor presently unquantifiable, since livestock do not distribute themselves homogenously over their range. While the intensity of accumulating impacts would be therefore reduced, impacts effected in the interim would be permanent and irreversible.

If restoration grazing systems in the Wall Canyon and Bare Allotments were to succeed in achieving a trend toward habitat-type potential in vegetation, the accompanying reduction in erosion would have the beneficial effect of stabilizing cultural sites. The benefit could extend to a large number of the open sites in the allotments, but the degree of benefit would be a function of the actual degree of vegetative response, and of the intensity of trampling and erosion of cultural resources which transpired before erosion was effectively retarded.

Seven archaeological sites could be impacted during the construction of proposed water developments (six springs and one reservoir). The nature of impacts would be as described in Chapter 3 (TABLE 3-15).

Pipelines, fences, wells, and cattleguards in the Wall Canyon and Bare Allotments would have the impacts described in Chapter 3.

RECREATION RESOURCES

No impacts beyond those occurring under present management would result.

Existing trends indicate a decline in resources that are directly related to high-quality recreation use, such as water quality, vegetation, watershed, and wildlife habitat; however, it would be anticipated that recreation use would show some natural increase, due to increased demand and public pressure, although actual quality of recreational pursuit could decrease in value.

WILDERNESS RESOURCES

The extent of impacts on wilderness resources cannot be specified as specific locations for wilderness study areas from which wilderness area designations may result have not as yet been identified.

However, it is assumed that wilderness values would be adversely impacted since the resources upon which the attractiveness of or demand for wilderness areas may be based would be reduced in quality.

LAND USES

Livestock Grazing

The primary impact of this alternative on livestock grazing would be the decrease in the amount of livestock use allowed. Herd size and red-meat production would decrease correspondingly. Calf and lamb weights, death loss, cull weights, and percent calf and lamb crop would remain as presently exist (TABLE 3-17). The normal operation for livestock operators would remain as described in Chapter 2.

Agriculture

Decreases in livestock use would place additional demands on base ranches and change normal methods of operation. Impacts on individual ranch operations however are unpredictable. The value and availability of additional forage sources (i.e., hay, pasture, and grain) would determine which adjustments would be made.

SOCIO-ECONOMIC CONDITIONS

Economic Conditions

POPULATION

Populations within the study area are not expected to change significantly over the next 20 years. The population projections shown in TABLE 8-3 are based on factors external to the study area and region.

EMPLOYMENT

Labor requirements for the construction of range facilities would consume an estimated 42 manmonths (see Chapter 3, Socio-Economics, for method of calculation).

From a ranch-labor perspective, employment characteristics within the study area are not expected to change, unless large corporate ranches continue to buy up smaller, less economical units. If this trend continues, numbers of jobs made available in agriculture may decrease, although any decrease would be minor when compared to the region, i.e., 1,500 individuals are currently employed by agriculture (TABLE 2-46). Maintenance of range facilities that would be developed under this alternative would not require any additional ranch labor.

TABLE 8-2
KNOWN CULTURAL RESOURCES WHICH WOULD BE IMPACTED BY GRAZING AND WATER DEVELOPMENTS UNDER ALTERNATIVE #1

Impacts by Allotment	Villages	Base Camps	Temp. Camps	Lithic Scatters	Quarries	Hunting Stations	Rock Shelter	NRHP[1]
Denio								
Trampling[2]			4	2	2		1	1
Wall Canyon								
Trampling			2	3	4			
Bare								
Trampling			12/2 [3]	10	4			2
Water Development[4]			(#61) 1	(#73) 1				
Lower Lake								
Trampling	8[5]				5			1 (District)
Duck Lake								
Trampling	1[5]	5	2	6	1			1 (District)
Home Camp								
Trampling		2	7	4	1			1
Water Development			(#90,179) 2					
Tuledad								
Trampling	4	8	17	25	5	1		5 (Incl. 2 Dists.)
Water Development		(#12,37) 2	(#35) 1					2

[1] NRHP: Sites or districts eligible for nomination to the National Register of Historic Places.

[2] Sites which would be impacted by intense cattle trampling.

[3] Twelve sites on public lands, two on private lands.

[4] Sites which would be directly impacted by spring/reservoir projects. Parenthetic numbers indicate specific water developments.

[5] All sites on private lands.

TABLE 8-3

POPULATION PROJECTIONS FOR CALIFORNIA COUNTIES

	1980	1985	1990	1995	2000
Lassen County	20,300	22,000	23,200	24,100	25,500
Modoc County	8,100	8,400	8,700	9,000	9,300

Source: Report 74, P-2, California Department of Finance, Population Research Unit, June 1974.

Other than agriculture, geothermal energy development would appear to present the most significant employment opportunities within the region over the next 20 years. The location of one geothermal generating plant in Surprise Valley could employ an estimated 215 people during field development (first seven years). After construction, an estimated 20 people would be required for maintenance/operation of any given plant. If each construction/maintenance job stimulated employment in other sectors (such as trades or services), total employment increases would be even higher. However, in the absence of such development, it is doubtful whether the regional mining/construction sectors would appreciably increase as an employer within the region. It should also be noted that even with such development, employment within the study area would not be greatly impacted, i.e., there are no locally based contractors/labor forces skilled in this type of work.

Employment in the regional trade/services sector (including government employment) is expected to continue its upward trend over the next two decades. As a result, the regional (and local) economy would not be determined so much by local industry but by decisions reached outside the region in various Federal and State government headquarters. For example, between 1960-68, 1,000 of the 1,225 new jobs created in Lassen County were the result of increases in governmental positions (Williams, Cook, and Mocine, 1968, p. 6-7).

INCOME

Regional Livestock-Related Income. The projected outlook for livestock grazing patterns within the study area is summarized in the Vegetation and Agriculture sections of this alternative. Recent vegetative trend studies indicate that certain key vegetative communities are experiencing upward trends, while others are stagnant or declining. Accordingly, a reduction in livestock grazing of 25 percent (in terms of current authorized livestock AUMs) is considered to be the most accurate projection of livestock use 20 years hence, except for the Wall Canyon Allotment where grazing would continue at present levels. This decline is assumed to occur in annual increments.

Therefore, the anticipated level of forage from public lands used by livestock in 20 years would be 35,052 AUMs, a reduction of 10,807 AUMs from existing levels. This decrease in AUMs would thereby reduce regional livestock sales by an estimated $85,591 (10,807 AUMs of livestock grazing × $7.92/AUM). Given a livestock multiplier factor of 1.74, this loss in AUMs would decrease the regional economy by $148,928 ($85,591 × 1.74). Included is a decrease in household incomes from existing levels of $31,668 ($85,591 × household coefficient of .37).

Allotment Livestock-Related Income. For those allotments within the study area, the operators' discounted costs for operating for a 50-year time span at a 6⅛-percent interest rate would be $1,608,896 (TABLE 8-4). This figure includes the ranchers' costs of maintaining existing facilities, plus those new facilities which are called for under this alternative. Also included are payments for grazing fees. It should be noted that grazing fee charges would be reduced in proportion to the 25-percent reduction in AUMs.

TABLE 8-4 also portrays rancher revenues. The operators' discounted revenues which would be derived from operating under this alternative for 50 years (at a 6⅛-percent interest rate) would be $3,750,734. The difference between these discounted costs and revenues is positive ($2,141,838), indicating that the livestock industry would not be financially eliminated by a 25-percent reduction in forage derived from public lands within the study area. However, a higher interest rate (12 percent) does reduce the difference between the discounted costs and revenues (to $1,416,326).

Contract Construction-Related Income. Implementation of this alternative would require the expenditure of $107,600 for range facilities on public lands within the study area (TABLE 8-5), of which area ranchers would assume costs of $4,000. Through such expenditures, an additional $10,760 in wages paid to construction labor could be added to the local/regional economy during the two-year construction period. In turn, this increase in wages would add an estimated $12,051 to household incomes in the region. The amount which would accrue to permanent residents of the region would, therefore, be an estimated $1,291, since the initial amount ($10,760) was to nonresident construction labor (see Chapter 3, Socio-Economics, for calculation routine).

Annual Maintenance-Related Income. Maintenance costs for existing range facilities, and new developments shown on TABLE 8-5, add an estimated $22,472 in wages into the local/regional economy each year. Using the household coefficient developed for the region, annual maintenance of existing and proposed range developments under this alternative therefore adds an estimated $25,169 to personal incomes (see Chapter 3, Socio- Economics, for calculation routine).

This redistribution of income results in a trade off: area permittees' costs increase with each new facility added (aside from spring development) while ranch labor revenues also increase because of the required maintenance duties.

Recreation-Related Income. Under this alternative, activity occasions are projected to increase by 35 percent over existing levels. These increases are discussed in the Recreation section of this alternative.

Due to the ambiguity of defining activity occasions, and the absence of data on their contribution to smaller economies like Surprise Valley, no estimate of economic impacts from recreation increases has been made for the local economy. However, the projected increase in activity occasions under this alternative is minor when compared to current activity occasion levels within the region (60 million).

Other Income Impacts. As additional government field personnel would not be required to implement this alternative, any additions to current regional/local personal income levels via such employment are not anticipated. However, of the total incomes derived from the nonfarm sector for Lassen County in 1974, over half (55.8 percent) was produced by government. In Modoc County, 40 percent of the nonfarm income was derived through the government sector. This trend of government wages making up a significant proportion of total gross incomes would probably continue in the region since not only are additional people finding work in the government sector, but wages are correspondingly higher than in many other fields.

Per capita incomes in the region have been consistently below the State average in the recent past (TABLE 8-6). In the absence of substantial industrial development, it would be expected that per capita incomes would remain below the State average. This alternative would not tend to raise the region's income status.

It would be likely that gross values of all agricultural crops sold within the region (Lassen-Modoc Counties) might continue to rise, although certain categories would probably continue to experience wide fluctuations. For example, in 1975, Lassen County's gross value for all agricultural crops was over $17 million, up nearly $150,000 from the 1974 figure, although livestock and poultry production was down almost $1 million from 1974 and approximately $5 million from 1973. In Modoc County, the 1975 gross value was $47 million, an increase of over $3 million over 1974 (U.S. Dept. Ag., 1975b, p. 1). Like Lassen County, however, increases derived from agricultural products in Modoc County came from hay, potatoes, and high grain yields; livestock production values actually decreased. Due to the nature of the market for beef and lamb, prices frequently vary widely from year to year, adding a significant element of speculation to the livestock business.

SOCIAL SUPPORT FACILITIES AND SERVICES

It would be highly unlikely that this alternative would have a significant impact on existing health, police, fire, water, sewage, and/or other social support systems.

PUBLIC FINANCE AND TAX BASE

Under this alternative, it has been estimated that there would be a reduction in available livestock forage of 10,807 AUMs in 20 years. By converting this decrease to livestock numbers that would have to be removed to maintain a proper stocking rate, the following decreases in livestock numbers can be expected: 1,120 sheep and 1,446 cattle (see TABLE 8-1). Given the State's tax rate on livestock, implementation of this alternative would decrease tax revenues by an estimated $4,200 each year after the twentieth year.

In addition to tax revenues from livestock being decreased by this alternative, property values would also decrease by an estimated $609,000 at the twentieth year. This figure reflects a decrease in livestock forage consumption of 10,807 AUMs by the twentieth year, continued production at that level through the fiftieth year, and discounting the value of this decrease using a 12-percent interest rate.

Assuming that methods of calculating taxes were to remain constant for the next 20 years (25 percent of market value × $8 per $100 of assessed value), annual property taxes would decrease by

TABLE 8-4
DISCOUNTED RANCHER COSTS/REVENUES UNDER THE "NO ACTION" ALTERNATIVE AT A 6-1/8 AND 12 PERCENT INTEREST RATES

Discounted Rancher Costs in 1976 Terms--6-1/8% Interest Rate

						Discounted Rancher Revenues				
Allotment	Improvement-Maintenance	Change In Grazing Fees 1/	Existing Level of Grazing Fees 1/	Total Discounted Rancher Costs by Allotment	Changed Quantity of Livestock Forage	Livestock Production Increased Nos. Higher Weights)	Cull	Cows	Existing Level of Livestock Forage	Total Discounted Rancher Revenues by Allotment
Selic-Alaska Cy.	$ 66,684	$- 5,580	$ 38,386	$ 99,490	$- 19,530	-	-		$ 134,353	$ 114,823
Tuledad	65,105	- 49,266	339,158	354,997	-172,431	-	-		1,187,053	1,014,622
Denio	42,752	- 7,344	50,593	86,001	- 25,704	-	-		177,076	151,372
Bare Ranch	131,835	-212,241	463,736	383,330	-742,844	-	-		1,623,075	880,231
Duck Lake	112,024	- 16,254	111,875	207,645	- 56,889	-	-		391,564	334,675
Lower Lake	5,886	- 3,132	21,625	24,379	- 10,962	-	-		75,688	64,726
Wall Canyon	38,957	-	81,606	120,563	-	-	-		285,621	285,621
Home Camp	74,015	- 43,938	302,414	332,491	-153,783				1,058,447	904,664
	$537,258	$-337,755	$1,409,393	$1,608,896	$-1,182,143				$4,932,877	$3,750,734
Discounted Rancher Costs Computed at a 12% Interest Rate:										
Selic-Alaska Cy.	$ 35,751	$- 2,133	$ 20,579	$ 54,197	$- 7,487	-	-		$ 72,025	$ 64,538
Tuledad	34,904	- 17,905	181,819	198,818	- 62,669	-	-		686,365	573,696
Denio	22,920	- 2,815	27,122	47,227	- 9,853	-	-		94,929	85,076
Bare Ranch	70,680	- 25,806	248,603	293,477	- 90,321	-	-		870,112	799,791
Duck Lake	60,058	- 6,231	59,975	113,802	- 21,807	-	-		209,913	188,106
Lower Lake	3,156	- 1,201	11,593	13,548	- 4,202	-	-		40,576	36,374
Wall Canyon	20,886	-	43,748	64,634	-	-	-		153,118	153,118
Home Camp	41,536	- 16,974	162,120	186,682	- 59,409				567,421	508,012
	$289,891	$- 73,065	$755,559	$972,385	$-255,748				$2,644,459	$2,388,711

1/ Assuming a charge of $2 per AUM per year.

Source: Benefit/Cost Analysis, BLM Susanville District, 1977.

TABLE 8-5
ESTIMATED COSTS OF FACILITIES BY YEAR OF EXPECTED COMPLETION PLUS MAINTENANCE

Type of Development	Total Units	Per Unit Cost ($)	No.	Year 1 Cost ($)	No.	Year 2 Cost ($)	Total Annual BLM Maintenance Costs	Total Annual Rancher Maintenance Costs
Water								
Springs	38	1,945	38	73,900				
Wells	2	4,000	2	8,000				
Reservoirs	3	5,233	3	15,700				
Fences								
Divisional	5 miles	2,000			5	10,000		
Totals				97,600		10,000	$40,585 1/	$34,320 1/
Income Effects on Local Households 2/				9,760		1,000	$12,176 3/	$10,296 3/

1/ Figures derived from benefit/cost ratios were prepared for each allotment within the Systematic Management Area. These monies indicate maintenance for projects now in existence. They are substantially higher than comparable figures shown in TABLE since in that table only the differences between existing maintenance costs and projected costs of facilities under the Proposed Action are shown.

2/ Estimate of that proportion of monies spent in construction (personal consumption expenditures) that would actually stay within the region. If it is assumed that 20 percent of total costs would be for wages, it must also be assumed that only about 50 percent of this 20-percent figure would actually remain in the region for motel rooms, meals, gas, etc. This assumption is made since out-of-area workers would be the principal contract recipients.

3/ Assuming that 30 percent of maintenance costs would be for wages and that local labor would be employed.

TABLE 8-6

PER CAPITA PERSONAL INCOME

	1970	1971	1972	1973	1974	Percent Change 1970-74
Lassen County	$3,367	$3,847	$3,961	$4,432	$4,498	25.1
Modoc County	3,829	4,333	3,921	4,884	5,793	33.9
California	4,493	4,711	5,044	5,491	6,032	25.5

Source: Computer Printouts for Personal Income By Major Sources: 1970-74, U. S. Department of Commerce, Bureau of Economic Analysis, Washington, D. C.

an estimated $12,180 if this alternative were implemented.

Social Characteristics

The prediction of anticipated trends or changes in attitudes or behavior patterns 20 years from now is difficult. However, the following discussion attempts to define those social trends which might occur.

Unless geothermal energy development were to occur within the region, no major influx of people would be anticipated, i.e., growth trends would continue at expected levels. Yet some new trends in socio-cultural values would be anticipated; any person moving into the region will have his own value system, which could lead to the introduction of new attitudes, beliefs, or opinions.

Whether nonresidents' beliefs about the values associated with Federal lands within the study area would create an interface with local user group attitude or behavior patterns cannot be determined. In previous instances, however, such as the proposed management of the Charles Sheldon Game Range in northwestern Nevada, user groups conflicted and views held by individuals living within the region were polarized against nonresidents.

In 20 years, corporate-style ranching could certainly leave an impact on beliefs and attitudes of those in the ranching segment of the economy. Such consolidations would be anticipated during the next two decades, but there would also be a strong likelihood that many traditionalists would continue to feel that selling out to such corporations is to be avoided, although behavior might not be consistent with attitudes. Other prevalent attitudes, such as that held by many area permittees which regard ranching as a lifestyle to be pursued and preserved, would undoubtedly remain.

Some changes in attitudes and behavior patterns would be anticipated during the next 20 years. To predict what would cause these changes, or to try to identify when the changes might occur locally would be impossible, however. It is believed that cognitive values would be affected less by future grazing management considerations than by other possible variables, such as geothermal energy development. Still, any change in grazing procedure within the study area could create some perceptual changes in current user groups.

Mitigation Measures

Each of the mitigative measures enumerated in Chapter 4 for cultural resources is appropriate under this alternative. Specifically, Measure 2 will be implemented for the 10 *National Register* eligible properties which would suffer intense livestock trampling, Measures 26 and 27 will be applied to the water developments which could impact seven archaeological sites, Measure 23 will be applied to all linear facilities (fences, trails, and pipelines), and Measures 3 and 4 to all proposed facilities not presently accessible by road. Measure 9 will be performed for all areas under custodial management. The cultural resources monitoring and inventory program will be implemented as described in Chapter 4.

No other measures to mitigate the impacts described above have been identified.

Unavoidable Adverse Impacts

Under this alternative, archaeological sites throughout the study area would continue to receive impacts from the passage of livestock. The effects of trampling and of livestock-related erosion could extend to a large number of predicted 7,702 potentially impacted sites, and would unquestionably affect many so-far undiscovered *National Register* eligible properties. All such impacts, however slight, would be permanent, and all lost information irretrievable.

All other impacts of implementation of this alternative as described above could not be mitigated and are therefore unavoidable.

ALTERNATIVE 2—NO LIVESTOCK GRAZING

Grazing Management Proposal

Under this alternative, it is assumed that all livestock grazing on public land would be terminated in 1980.

Landowners wishing to graze intermingled private land would be required to fence their property boundaries to prevent livestock from straying onto public land.

No further range facilities designed to facilitate livestock management would be implemented.

Approximately 190 miles of pasture fence currently existing on public land would be removed at a cost of approximately $190,000.

Existing water developments would remain operative.

Wild horses would be managed at the stated MFP levels, i.e., 100 head in the Tuledad Herd

Management Area, and 50 head in the Fox-Hog Mountain Herd Management Area.

Supervision would be handled with existing BLM personnel. No new personnel or manpower would be required.

Impacts of Alternative 2

VEGETATION

Impacts of this alternative on vegetation would be as described for the livestock grazing exclusions of the proposed action. Improvement in range condition would be evident within 15 years, although primarily as a result of increased vigor of livestock forage species. Increases in density (number of individuals per unit area) of these species would be much slower. Harper (1969) indicates that judiciously grazed areas have plants that are often healtheir, more vigorous and contribute more cover than areas that receive no grazing, and species diversity is often greater. Improvement would be most evident in the moistest habitat types, especially evident in the willow/Nevada bluegrass and aspen habitat types.

The greasewood/saltgrass habitat type would be expected to remain in "poor" condition; the shadscale/Indian ricegrass, greasewood/Great Basin wildrye, low sage-rabbitbrush, and big sage/bluebunch wheatgrass-Great Basin wildrye habitat types in "fair" condition; and the low sage/bluegrass-squirreltail and white fir habitat types in "excellent" condition. The baltic rush and Nevada bluegrass-sedge habitat types would be in "excellent" condition; and the condition of all other habitat types (except the low sage/Sandberg bluegrass and bitterbrush-big sage/bluebunch wheatgrass-Idaho fescue types, for which there are no data) would be anticipated to be "good" after 15 years following elimination of livestock grazing.

SOILS

Impacts of this alternative on soils would be as described for the livestock grazing exclusions of the proposed action.

A great decrease in erosion, sediment yield, runoff, and a great increase in cover and surface permeability would be anticipated for the soils of HT-9, 13, 14, 15, 16, 17, 18, 20, 24, 26, and 27. These are phases of the Disabel, Buntingville, Campore, Hussa, Welch Mosquet, Madeline, Hartig, Catnip, Ninemile, Touey, Mendeboure, Four Star, Mascamp, Powley, Hart Camp, Schamp Hapgood, Home Camp and Cummings Muck clay subsoil variant. All of these soils except those of HT-13, 26, and 27 would maintain or attain a cover percentage of greater than 60. No data are available for HT-27.

Accelerated erosion on the soils of HT-13 and 27 would be stabilized through improvement in vegetative growth to "excellent" condition and elimination of compaction and trampling by animals. Also, soil moisture regimes would become stabilized.

The Hapgood soils of HT-26 would maintain their greater than 60 percent cover by the stabilization and improvement of aspen stands.

There would be no change or a slight or moderate decrease in erosion, sediment yield, and runoff for the soils of the remaining habitat types in the study area. A slight or moderate increase or no change in permeability would result for the soils of these same remaining habitat types. These impacts would be associated with increases in vegetative-litter cover for the soils of the remaining habitat types in the study area. These soils either presently maintain a vegetative-litter cover of 60 percent or might not attain a cover of greater than or equal to 60 percent within 15 years or there are no data available on them.

WATER RESOURCES

Surface runoff would be reduced as a result of increased vegetative cover and increased evaporation of moisture. Water infiltration rates would increase moderately within the first 15 years. These impacts would occur rapidly during the first five years then would slow in later years because of the dominance of the xerophytic vegetation (sagebrush, rabbitbrush, etc.).

Consumptive use of water by domestic livestock would be reduced by about 39.1 acre feet.

The water quality would gradually improve as interflow, resulting from vegetative changes, increased.

Fence removal would have little or no effect on hydrologic conditions within the study area.

ANIMALS

Terrestrial Animals

Both short and long-term impacts of this alternative on wildlife species would generally be beneficial. The elimination of livestock grazing would eliminate competition between livestock and wildlife for food and cover and would allow progress toward recovery of habitat types destroyed or deteriorated by livestock grazing. Short-term impacts would be expected to be similar to those discussed in Chapter 3 for the rest treatment of systematic grazing. Long-term impacts would be expected to be similar to those discussed in Chapter 3 for grazing exclusions.

MULE DEER

Competition between livestock and deer for bitterbrush in the summer and fall would be eliminated and winter deer survival would be expected to increase. Competition would also be eliminated at greenup and through the summer for grasses and forbs and a resulting increase in summer fawn survival would be expected. Aspen stands, especially on moist sites, would be expected to recover and create better fawning cover for deer increasing fawn survival. Expected increase in deer survival would allow at least a moderate increase in deer numbers.

PRONGHORN ANTELOPE

Competition between antelope and livestock for forbs and grasses at greenup would be eliminated and heavy use of bitterbrush by livestock would also be curtailed. Short- and long-term increases in forage available to antelope would be expected to allow an increase in the population of at least double the current numbers.

SAGE GROUSE

Elimination of livestock trampling and disturbance of sage grouse nests would be expected to increase nesting success. Elimination of competition for forbs and cover between sage grouse chicks and livestock would increase sage grouse chances for survival. Meadow vegetation would be allowed to recover and maintain itself and would benefit sage grouse in the short term. In the long term, meadow and riparian vegetation would become rank and less desirable for sage grouse but uplands would become more desirable. Sage grouse populations would be expected to increase moderately as a result of elimination of livestock.

QUAIL

Elimination of livestock grazing would allow the tall rank growth of willows and other shrub species necessary for quail cover. Better cover would tend to increase quail survival but the scarcity of good cover plants would limit total population increases of quail to a small number.

WATERFOWL

Elimination of livestock grazing would be expected to have a beneficial impact on waterfowl habitat. Accumulation of vegetation cover around waterfowl nesting habitat would attract more nesting pairs and decrease susceptibility to predation which would allow more birds to be produced. Elimination of nest disturbance and trampling would also allow increases in nesting success. Waterfowl production on all areas where habitat occurs would be expected to increase significantly.

NONGAME SPECIES

Nongame species would generally be expected to benefit from the elimination of livestock grazing. On a short-term basis, immediate improvement of habitat conditions would occur by increasing food and cover for all species and by elimination of nest destruction and disturbance of birds. In the long term, habitat types of highest importance to nongame species would be in either excellent condition (bluegrass-sedge, baltic rush) or improving over their current poor condition (aspen, willow riparian). Nongame species would be expected to generally increase populations to a moderate degree.

THREATENED OR ENDANGERED SPECIES

Exclusion of livestock grazing would have a beneficial impact on California bighorn sheep habitat in the Hays Canyon area. Livestock and bighorn sheep compete directly for grass forage and reintroduction would be advisable only with the elimination of competition from domestic livestock. A small initial transplant (10-15 animals) would possibly increase to 30-50 animals in 15 years.

Aquatic Animals

Termination of all livestock grazing on public lands would result in beneficial impacts on 16.25 miles of public streamside. Without livestock grazing and trampling, vegetative recovery and bank stabilization would greatly improve. The net short-term impacts would be: an increase in the density of native grasses rushes, and sedges; an increase in the height and occurrence of shade-bearing shrubs; increased bank stabilization; a decrease in the rate of surface erosion and deposition; a decrease in stream width; an increase on stream depth; and more favorable water temperatures.

Full habitat recovery would depend on the extent of uncontrolled livestock grazing on public lands in the upper watershed. Sediments and high nutrient loads might continue to adversely affect the flora and fauna on public lands located downstream. Based on these uncontrollable parameters, the full extent to which the aquatic environment would mend itself would be unpredictable.

WILD HORSES

Termination of livestock grazing would eliminate the wild horses' main source of competition for forage thereby enhancing forage availability and quality for the horses.

The only potential adverse impact would be from private landowners fencing their private land, thereby creating a hazard to the horses. However, this would be limited because of the small percentage of private land in wild horse areas.

VISUAL RESOURCES

It would be anticipated that elimination of livestock grazing from the entire study area would result in a substantial overall improvement to the visual landscape, but not to a point where VRM classes would change.

Removal of approximately 190 miles of existing fence would improve the visual resources, as existing fences could have some of the same negative impacts as stated in Chapter 3 for new fence construction. Additional fencing of intermingled private lands would result in adverse visual impacts. The method of fence removal could also cause adverse impacts.

Positive impacts similar to those stated for grazing exclusions in Chapter 3 could be expected throughout the entire study area in relation to vegetation, watershed, and wildlife habitat improvements. There would be no negative impacts related to contrasts with adjacent grazed pastures as the entire study area would be excluded from grazing.

CULTURAL RESOURCES

Termination of all livestock grazing on public lands would have no adverse impacts on cultural resources in the study area; removal of the forces of trampling would constitute a significant improvement over the present situation. A large number of the predicted 7,702 open archaeological sites (including those in present custodial management allotments) could stand to benefit, but benefits would be most effectively realized at those locations (such as major water sources) where livestock congregate. These benefits would be compounded by virtue of the tendency of such places to be the locations as well of the largest, most complex, and longest occupied habitation sites.

Long-term benefits would accrue from the gradual revegetation of the area and the concomitant reduction in erosion.

The only adverse impacts which this alternative might produce would result from the removal of the existing pasture fences. If the removal consisted of a mechanized operation, its impacts would be similar to those of initial fence construction, described in Chapter 3. A presently unpredictable number of sites could suffer some disturbance.

RECREATION RESOURCES

It is anticipated that this alternative would have a positive impact on recreation resources and use opportunities.

With the elimination of grazing, recreation management would take on increased emphasis and new or additional recreation use might be attracted to the area.

In 15 years, it is estimated that the study area would receive 60,074 recreation activity occasions, an increase of 77 percent over the present (based on the 1976 figure utilized in Chapter 2, projected upward corresponding to the annual recreation participation increases shown in the Nevada Statewide Comprehensive Outdoor Recreation Plan).

Removal of 190 miles of existing fence would provide a beneficial impact to those recreation uses (hunting and ORV and back-country travel) for which fences become an impediment to free movement.

With this fence removal and the exclusion of grazing over the entire study area, both the quality and quantity of recreation experiences would be expected to improve.

WILDERNESS RESOURCES

Impacts on wilderness resources cannot be addressed in specific terms since specific locations for wilderness study areas or wilderness areas have not as yet been identified.

Removal of 190 miles of fence would eliminate a potential impediment to wilderness designation, if it falls within wilderness designation areas.

Exclusion of grazing, although not necessary for wilderness designation, would permit long-term improvements of the resources upon which some wilderness values are based.

LAND USES

Livestock Grazing

The primary impact of this alternative on livestock grazing would be the cancellation of all livestock use. All red-meat production and other livestock benefits derived from public ranges would cease. Total herd sizes for livestock operations would be substantially reduced. Costs and manpower associated with livestock management on public lands (i.e., maintenance of management facilities and handling of livestock) would cease. Increased costs and manpower would be required for ranchers to fence intermingled private land. Fencing would be necessary to prevent livestock from drifting onto public land.

Agriculture

Impacts are undeterminable for this resource due to the infinite range of possibilities of a no grazing proposal. Impacts on this resource would depend largely upon how the farming and ranching community would respond to drastic changes in operation.

SOCIO-ECONOMIC CONDITIONS

Economic Conditions

POPULATION

There is a chance that one or two of the ranch operations within the study area might be forced to sell their businesses to other, more affluent ranches if this alternative were implemented. These ranch consolidations could thereby perpetuate a movement of people out of the study area. However, any population decrease in ranch families might be offset since most area permittees have stated that they would remain in the livestock business and would wish to retain their residence in Surprise Valley. Therefore, most permittees might choose to reduce current herd sizes to that which their base properties could support, i.e., up to 75-percent reductions in sheep numbers and 40-percent reduction in cattle numbers would be anticipated.

Although it would be highly unlikely that many ranch families would leave the area, some decreases in overall population levels could be expected, for some ranch hands would not be as necessary with the advent of range closures on the public lands. Implementation of this alternative could lead to an estimated 10-12 ranch employees and their families being forced to attain a livelihood elsewhere, resulting in a population decrease of around 25-30 individuals.

EMPLOYMENT

It would not be likely that discontinuance of grazing would upset present levels of employment within the region, as a majority of the operators stated during the interviews that they would continue in the ranching business, with or without the use of public lands.

Some reductions in numbers of ranch laborers employed by area permittees, however, could be expected. For example, if 10 full-time cowboys were to lose their jobs through the implementation of this alternative, the agricultural sector's employment level would decrease by an estimated 110-115 manmonths of labor which is currently consumed in the region annually. Wage levels for ranch labor now average around $472/month—labor reductions would therefore impact revenues within the local/regional economy.

Only water developments which are now in existence would be maintained on Federal lands in the study area. Labor for such maintenance and operation would consume an estimated 25 manmonths annually. In addition, 161 miles of existing fence on public lands would be removed under this alternative; labor consumed during the removal process would total an estimated 40 manmonths. It is estimated that maintenance of facilities located on private lands might continue to consume up to 68 manmonths per year.

Federal supervision would not require any additional manmonths under this alternative.

INCOME

Regional Livestock-Related Income. Under this alternative, livestock grazing on public lands within the study area would be terminated in the second year of the implementation schedule. The anticipated decrease of 46,225 AUMs of livestock grazing would reduce regional livestock sales by an estimated $366,102 (decrease of 46,225 AUMs X $7.92/AUM). Given that the livestock multiplier factor for the region is 1.74, this loss in AUMs would decrease the regional economy by $637,018 ($366,102 X 1.74). Included is a decrease in household incomes of $135,458 ($366,102 X household coefficient of .37).

In perspective, these range closures would result in a reduction of 25 percent of the forage needs for livestock within the study area. More importantly, these grazing terminations would result in reduction of Modoc County's livestock sales by an estimated 5 percent, which would lead to a decrease in total personal income levels within Modoc County of 0.3 percent (see Chapter 2, Socio-Economics).

Allotment Livestock-Related Income. If Alternative 2 were implemented, it would be quite likely that a majority of the livestock operations within the study area would become inoperable, although several area permittees would undoubtedly remain in the livestock business. However, with the loss of grazing privileges on the public lands, herd sizes would have to be cut back to that which base properties can support, unless additional private pasture could be found elsewhere. Therefore, revenue levels would decrease substantially from current levels.

To be more specific, it is estimated that rancher revenues that would be foregone (lost) over a 50-year period, using a 6⅛ percent discount rate would total $4,932,877 (see TABLE 8-7). In addition to this loss of revenue, there would be a $1,946,651 reduction in rancher costs of operation on public lands. These costs include payment of grazing fees and maintenance of existing facilities on public lands. The net loss to the ranchers would therefore be $2,986,226. Similarly, using a discount rate of 12 percent, the net loss to the ranchers would be $1,599,009. It should be noted that neither of these figures includes losses in value of the Bicondoa operation; the estimated decrease in value of this particular operation is $21,000.

Contract Construction-Related Income. Under this alternative, no development of range facilities in support of livestock grazing on public lands within the study area would be contemplated.

Annual Maintenance-Related Income. Under this alternative, an estimated 190 miles of fence would be removed during the first and second years of implementation. Total cost of removal is an estimated $190,000 (or $1,000 per mile). As these costs would occur only once, and as it is estimated that nonresident labor would be employed, it is assumed that only 10 percent of the monies spent during the removal process would actually remain within the region. This conclusion is based on the assumption that only 20 percent of total removal costs would be for wages and only 50 percent of that total would be spent for motel rooms, meals, etc.

Therefore, about $19,000 in wages paid to labor would be added to the local/regional economy during the removal process. These wages, plus subsequent respending, would add an estimated $21,240 to household incomes within the region, although the amount that would accrue to permanent residents would be the difference, or $2,240.

Moreover, those monies presently spent to maintain existing fence improvements on Federal lands would no longer be required, although maintenance of water projects would continue. The maintenance of existing water facilities on public lands would continue to add an estimated $3,012 in wages into the local/regional economy each year. Using the household coefficient developed for the region, such maintenance would therefore add an estimated $3,373 to personal incomes.

Recreation-Related Income. Under this alternative, activity occasions are projected to increase by 78 percent over current levels by the fifteenth year. The rationale behind these increases is presented in the Recreation section of this alternative.

Due to the ambiguity in the definition of the data unit (activity occasions) and the absence of data on its contribution to small economies such as Surprise Valley, no estimate of economic impacts with regard to changes in activity occasions has been made for the local economy.

This increase in activity occasions in the study area would be very small compared to the current level in the region (60 million).

Other Income Impacts. As additional Federal personnel would not be required to implement this alternative, it is assumed that other impacts on income levels from wages paid to individuals within the region would be unlikely.

SOCIAL SUPPORT FACILITIES AND SERVICES

This alternative would not have an appreciable impact on social service systems within the study area for, even though all grazing would be terminated, revenues derived from livestock sales from the study area account for less than 0.3 percent of Modoc County's total personal income.

PUBLIC FINANCE AND TAX BASE

Under full implementation, livestock numbers that would be removed from the use of the

TABLE 8-7
DISCOUNTED RANCHER COSTS/REVENUES UNDER ALTERNATIVE 2 AT 6-1/8 AND 12 PERCENT INTEREST RATES

Discounted Rancher Costs in Present Terms--6-1/8 Percent Interest Rate				Discounted Rancher Revenues	
Allotment	Improvement/ Maintenance	Existing Level of Grazing Fees[1]	Total Discounted Rancher Costs by Allotment that would be foregone	Existing Level of Livestock Forage	Total Discounted Rancher Revenues by Allotment that would be foregone
Selic-Alaska Cy.	$ 66,684	$ 38,386	$ 105,070	$ 134,353	$ 134,353
Tuledad	65,105	339,158	404,263	1,187,053	1,187,053
Denio	42,752	50,593	93,345	177,076	177,076
Bare Ranch	131,835	463,736	595,571	1,623,075	1,623,075
Duck Lake	112, 024	111,875	223,899	391,564	391,564
Lower Lake	5,886	21,625	27,511	75,688	75,688
Wall Canyon	38,957	81,606	120,563	285,621	285,621
Home Camp	74,015	302,414	376,429	1,058,447	1,058,447
	$537,258	$1,409,393	$1,946,651	$4,932,877	$4,932,877
Discounted Rancher Costs if Computed at a 12 percent Interest Rate					
Selic-Alaska Cy.	$ 35,751	$ 20,579	$ 56,330	$ 72,025	$ 72,025
Tuledad	34,904	181,819	216,723	636,365	636,365
Denio	22,920	27,122	50,042	94,929	94,929
Bare Ranch	70,680	248,603	319,283	870,112	870,112
Duck Lake	60,058	59,975	120,033	209,913	209,913
Lower Lake	3,156	11,593	14,749	40,576	40,576
Wall Canyon	20,886	43,748	64,634	153,118	153,118
Home Camp	41,536	162,120	203,656	567,421	567,421
	$289,891	$755,559	$1,045,450	$2,644,459	$2,644,459

[1] Assuming a charge of $2 per AUM per year.

Source: Benefit/Cost Analysis, BLM Susanville District, 1977.

Federal range would total an estimated 5,000 head of sheep and 6,313 head of cattle. If, in fact, it were not possible to find other pastures to support these animal units, other than base properties, which are already used for hay production as well as the support of other livestock which are not turned out on public lands, annual livestock tax revenues could be decreased by an estimated $18,420 after the second year of implementation.

Since ranch property values include the capitalized value of the associated BLM grazing privileges, property values might decrease by an estimated maximum of $2,685,000 (no inflation assumed). This figure reflects a decrease in livestock forage consumption of 46,225 AUMs by the second year, continued production at that level through the fiftieth year, and discounting the value of this decrease using a 12-percent interest rate.

Assuming that methods of calculating taxes were to remain constant for the next 15 years (25 percent of market value X $8 per $100 of assessed value), annual property taxes would decrease by about $53,700 after implementation of this alternative.

Social Characteristics

This alternative, if implemented, would drastically change existing behavior patterns for people who now reside in and/or use the public lands within the study area. Because of these behaviorial changes, corresponding changes in attitudes might occur. It would be likely that this "No Grazing" Alternative could create a certain amount of social unrest within the region.

For example, it would be very probable that this alternative would generate widespread support in certain circles of user groups, particularly among those who are most concerned with wildlife of the area, or who feel that the highest and best use of public lands in the study area, should be for recreation. This support would be likely since: (1) competition between wildlife and livestock for available forage would be eliminated; (2) livestock fences now in existence would be removed; and (3) the development and/or maintenance of other facilities on public lands would be minimized.

Because of these factors, it would be likely that people who envision increased numbers of harvestable game species and/or value the intrinsic importance of wildlife would applaud the implementation of this alternative. With regard to particular area wildlife species, i.e., wild horses, proponents might support the alternative since fences, which might cause injury or disrupt movement patterns, would be removed. Moreover, other user groups might support the removal of man-made structures (specifically fences) as they: (1) conflict with the area's aesthetic and wildland values; (2) because they disrupt certain forms of recreation, such as ORV use. This alternative, however, would not eliminate conflicts between the various categories of recreational and wildlife user groups on the use of Federal lands within the study area. Still, it would be likely that, faced with a choice of advocating no grazing or grazing, recreational/wildlife-oriented groups might support implementation of this alternative.

On the other hand, Alternative 2 would create serious problems for area ranchers, for it would not only hurt them financially but, perhaps more importantly, it would severely impact a way of life that has been passed down through generations of ranch families for over 100 years. Most present-day ranchers in the area know the Federal lands in their allotments more intimately than anyone; many of the names given to unique topographic features in the area were first prescribed by the ancestors of these present-day ranchers. Although no property taxes are paid on the Federal lands, many area ranchers appear to view these lands as being placed in their guardianship, regardless of how the lands have been treated. Thus, to close these lands to grazing severs the bond between some ranch families and the Federal lands within their allotments. It would be highly unlikely that this induced behavioral change would ever be tempered by a corresponding change in attitudes that would allow area permittees to accept the conditions of as a proper course of action. It would be more likely that area ranchers might become extremely antagonistic towards the Federal government in general, and BLM in particular, if this alternative were implemented.

Moreover, elimination of grazing privileges on Federal lands within the study area might be perceived by the range livestock industry at large as setting a precedent whereby grazing terminations might be conducted on all public lands. In turn, this could result in a change in the social status of ranchers within both the study area and the region. That is, currently, many of the leaders in the various communities are ranchers. If rancher status were jeopardized, some other sector in the community might appropriate the duties of leadership in the midst of the ensuing social upheaval. Therefore, it would be likely that any attempt to terminate grazing on large acreages of Federal lands within the study area would be highly criticized by area permittees and their ranching associates throughout the region.

In addition, range closures would test ranchers' values of resolve and self-determinism for, without the Federal range, area permittees would be forced to run only those numbers of livestock that their base properties and other lease lands could support. Those who maintain that ranching is a lifestyle as well as a business might choose to remain on their ranches. For others, economics might be the overriding issue and, therefore, their only option might be to sell their ranches to other operators who could consolidate these scattered holdings into an economic unit. As stated before, however, during the course of interviews with area permittees, ranchers frowned upon such consolidations. Thus, it would be likely that most area ranchers would be highly critical of any proposal that might lead to such ranch consolidations.

Finally, implementation of this alternative would make use of private lands which lie intermingled with the majority of Federal lands within the study area unusable. Thus, Alternative 2 would make it impossible for area permittees to use their own lands, unless they were to agree to fence off their properties from the public lands to prevent livestock trespasses. In some cases, particularily where larger blocks of land are involved, the rancher might do that, although the cost of fencing might be prohibitive (at $2,000 per mile). In cases involving smaller acreages, however, the costs of fencing would be prohibitive. Area permittees might try to contend in court that Alternative 2 would lead to "inverse condemnation" of private lands, or the unreasonable impairment of a landowner's property interests by the government—through the implementation of certain regulations, without just compensation.

Regardless of these types of legal issues, there would be little doubt that area permittees would be vehemently opposed to implementation of this alternative, for it could quite possibly lead to social and economic calamity for most area operations. Moreover, range closures of the type called for in this alternative would invite trespass situations, which could lead to a further deterioration in relationships between area permittees and the Bureau of Land Management.

Mitigation Measures

Existing fencelines will be surveyed for cultural resources. Where sites have already been transected and would be further impacted by mechanized operations, removal by hand will be performed to minimize disturbance.

In areas where no access currently exists, removal of fence materials and hauling will be in a manner that causes the least amount of surface disturbance.

No other measures to mitigate the described impacts of this alternative have been identified.

Unavoidable Adverse Impacts

Very minor disturbance of some cultural sites might result from fence removal, even with the application of mitigation.

All other impacts of implementation of this alternative, as described above, could not be mitigated and would therefore be considered unavoidable.

ALTERNATIVE 3—PROPOSED ACTION WITH LIVESTOCK REDUCTIONS

Grazing Management Proposal

This alternative proposes to implement the same grazing systems and range facilities as those described in Chapter 1 with the following modifications.

STOCKING RATE

Initial stocking rates would be based upon SCS stocking rate guides for the average recommended stocking rate in less favorable years for each range site in accordance with its range condition class. Stocking rates would be based upon the sum of AUMs calculated for two pastures with least capacity in three pasture systems. In the two-pasture system, stocking would be based upon the pasture with least capacity (TABLE 8-8).

ALLOCATION OF FORAGE

Deer and antelope would be allocated forage at present demand levels by pasture (TABLE 8-8).

Wild horses would be allocated forage at MFP population levels by pasture (TABLE 8-8).

Livestock would be allocated the remaining forage with total use not to exceed the pasture limitations described above.

TABLE 8-8
ALLOCATION OF FORAGE--ALTERNATIVE 3

Allotment/Pasture	Current Authorized AUMs	AUMs Available by Pasture in Alt. 3	Deer Demand (AUMs)	Antelope Demand (AUMs)	Bighorn Sheep (AUMs)	Wild Horse Demand (AUMs)	Current Livestock Use (AUMs)	Net Change Livestock (AUMs)	Livestock Reduction (%)
Bicondoa	368	368	27	27	314	0	0	-368	100
Alaska/Selic	1,239	1,204	400						
Alaska Canyon	648	576	200	0	0	0	376	-863	70
Selic Canyon	591	628	200	0	0	0			
Tuledad	10,947	12,181	5,850	1,083		1,200	1,692	-9,255	85
Coppersmith		3,609	1,950	574		360	725		
Cottonwood		5,433	1,950	287		840			
Bare Creek		3,139	1,950	222			967		
Home Camp	9,761	9,349	864	540			4,681	-5,080	52
Hart Camp		2,583		250			2,333		
Hayes Canyon		3,053	624	81			2,348		
Grass Lake		3,713	240	209					
Denio	1,633	1,556	102	108			794	-839	51
South		378		74			304		
North		564	12						
East		614	90	34			490		
Duck Lake	3,622	4,445	162	276			2,169	-1,442	40
North		1,278	54	60			1,164		
West		1,924	54	32					
East		1,243	54	184			1,005		
Lower Lake	698	505	54	50			194	-504	72
South		179		50			129		
Middle		92	27				65		
North		234	27						
Wall Canyon	2,634	3,532	81	208			1,906	-728	28
Seeding		631		52			579		
East		1,400	11	52					
West		1,501	70	104			1,327		
Bare	14,968	14,592	810	617			5,910	-5,058	61
Upper Bare							4,718		
Hog Mountain		2,374	178	59		600	1,537		
Fox Mountain		3,610	373	56			3,181		
Clover Creek		5,615	259	94					
Lower Bare							1,192		
Duck Flat		960	0	216			744		
Hoover		532	0	84			448		
Old Camp		532	0	108					
TOTALS	14,968	47,732	8,350	2,909	314	1,800	17,722	-28,137	61

After wildlife, watershed, and wild horse objectives have been met, additional forage would be allocated to livestock.

Impacts of Alternative 3

Because this alternative proposes the same management components, including systematic and custodial grazing management, grazing exclusions, range facilities, and reseeding tests, as the proposed action but with reduced initial stocking rates, most impacts would be the same as those described in Chapter 3. Impacts which would differ are described below.

VEGETATION

Impacts of this alternative on vegetation would be as described in Chapter 3. Differences would be in degree of impacts and rates of change.

The presently available vegetation data (APPENDIX F), which are used to compute initial stocking rates for this alternative, cannot substitute for an intensive range survey in the estimation of livestock grazing capacities. However, the proposed reduction in livestock grazing pressure (AUMs) would be expected to provide a conservative initial stocking rate from which adjustments could be made upward as range conditions improve. Reduced stocking rates would relieve grazing pressure on the less accessible land areas, and noticeable improvement in range condition would be anticipated in those areas. Utilization pressure on antelope bitterbrush would be expected to decrease, with the possible result of halting the present downward trend of most bitterbrush browse ranges. Bitterbrush individuals within close proximity to livestock concentration areas would continue to lose vigor, however.

All other impacts on vegetation would be as described for the proposed action (Chapter 3).

SOILS

Reduction of initial grazing intensity would significantly reduce erosion and sediment yield in the A and B treatment pastures in the short term. Increased vegetation and litter cover and increased permeability in areas distant from water would decrease erosion and sediment yield to slight or none. Impacts would be similar to those described in Chapter 3 on areas adjacent to water, since livestock would still remove most of the vegetation.

In the long term, improved vegetative responses in areas distant from water would increase the rate of improvement in erosion and sediment yield. Concentration areas would remain as described in Chapter 3.

WATER RESOURCES

Impacts on water resources resulting from reduced livestock use would be variable. Impacts on livestock concentration areas would be as described in Chapter 3.

In outlying areas which would receive little or no grazing, the increased rate of vegetation improvement would effect a corresponding increase in watershed improvement.

Surface runoff would decrease throughout the total area.

ANIMALS

Terrestrial Animals

SHORT-TERM IMPACTS

The short-term impacts under this alternative would vary according to grazing treatments and would depend on the cumulative results of the system at the end of one grazing cycle. Impacts would be similar to those described for the proposed action with major differences occurring only in the degree of impacts and rates of change.

Mule Deer. Because of the proposed livestock reductions and allocation of forage for big game animals, the amount of competition between livestock and deer would be light, with the exception of the Nevada bluegrass-sedge and the willow/Nevada bluegrass habitat types.

The net impact after the first cycle of the grazing systems would be expected to be a reversal of the downward trend in the deer population. A 5- to 10-percent increase in deer population would be anticipated. Drought or severe winter weather would hold expected gains toward the lower end of the range, while a mild winter, abundant spring and fall moisture, and adaptability of deer to change their use patterns would push expected gains toward the higher estimate. The major areas of expected impacts would be in the Tuledad, Bare, and Home Camp Allotments, which contain the largest percentage of deer habitat. Benefits to deer would be least when livestock use the Cottonwood pasture of the Tuledad Allotment where concentrated deer winter use occurs. Livestock use on the Hays Canyon pasture in the Home Camp Allotment and the Clover Creek pasture of the Bare Allotment would be detrimental to summering deer herds because the majority of range occurs in one pasture.

Pronghorn Antelope. The reduction of livestock numbers according to this alternative would serve to minimize any adverse impacts in Treatment A and B pastures. Competition between livestock and antelope for bitterbrush would be minimized because of reductions in livestock use.

The net impact at the end of the first cycle of the grazing system would be expected to be an increase in antelope population.

Sage Grouse. Reductions in livestock use would slightly lessen the grazing pressure around critical meadow complexes. However, since these would be livestock concentration areas even under light stocking rates, impacts on sage grouse would be very similar to the proposed action.

The impacts of all three treatments would be the decrease of birds in the Treatment A pasture (30 to 38 percent of the study area) each year and an increase in the sage grouse population in the Treatment B and C pastures (69 to 70 percent of the study area) with a net result of a larger sage grouse population in the study area, notwithstanding the effects of other limiting factors or the cyclic nature of sage grouse populations. Adverse impacts would be less in the two-psasture system.

Quail. In the short term, quail would be affected in generally the same way as sage grouse with adverse impacts occurring during Treatment A and beneficial impacts occurring during Treatments B and C. The net short-term impacts would be a slight increase in quail populations.

Waterfowl. Because livestock normally concentrate heavily in waterfowl nesting habitat and keep vegetation closely hedged, the lower stocking rates would not change impacts related to waterfowl.

Nongame Species. No cumulative impacts of the systematic grazing systems on nongame species populations would be expected.

Threatened or Endangered Species. The bald eagle and peregrine falcon would not be expected to be significantly impacted by the proposed systematic grazing.

LONG-TERM IMPACTS

The long-term impacts of this alternative would be the net response of animal populations in 15 years. Expected impacts have been formulated by analysis of animal population responses to successional changes in vegetation composition and densities and responses to the amount of vegetation present in time and space to meet animal life requirements. Impacts on species other than those discussed below would be the same as impacts described in Chapter 3.

Mule Deer. As a result of livestock reductions, bitterbrush and other browse species would be much improved in vigor and the trend would be static or upward on most of the study area. The increase of browse forage on the study area would tend to increase fawn survival and therefore increase deer production.

The expected decrease in winter deer mortality, because of increased bitterbrush availability, and the expected increase in fawn survival due to increased amounts of perennial grass and forbs during spring and early summer would probably exceed the losses expected because of competition for forage in the Treatment A pastures. The increase in deer populations expected as a result of the long-term vegetative changes and livestock use patterns is estimated at 20-30 percent (TABLE 8-9).

Pronghorn Antelope. Impacts on antelope populations would be the same as those described in Chapter 3 with the exception of impacts related to forage competition. Reductions in livestock use would provide additional forage for antelope on areas distant from water. It is estimated that a 75- to 100-percent increase in antelope would be possible.

Threatened or Endangered Species. The bald eagle and peregrine falcon would not be expected to be significantly impacted by this alternative.

Aquatic Animals

Alternative 3 proposes substantial livestock reductions in the Tuledad, Duck Lake, Wall Canyon, and Selic-Alaska Canyon Allotments but proposes no change in season of use or duration of use. Livestock numbers would be reduced by 85 percent, 40 percent, 28 percent, and 70 percent, respectively. Based on the established grazing habits of cattle and the overall lack of upland water developments in the allotments, livestock would continue to congregate along streambeds and remain there for two out of three years in the three-pasture systems and every other year in the two-pasture system. A total of 16.25 miles of public streamside could be impacted in addition to 30 miles of private streamside. All eight streams and both reservoirs would be affected.

The major short-term impacts would result from two successive years of late-season grazing.

TABLE 8-9

RANGE IN MULE DEER POPULATION NUMBERS EXPECTED ON SYSTEMATIC GRAZING AREAS 15 YEARS AFTER IMPLEMENTATION OF ALTERNATIVE 3

Season of Use	Deer Herd Management Unit					
	012	013	014	015	Calif.	Total
Yearlong	82-88	432-468	151-164	550-595	-	1215-1315
Dec. 1 - April 31				1632-1768	-	1632-1768
April 1 - Oct. 31					3600-3900	3600-3900
Nov. - Dec. 31					1200-1300	1200-1300

Vegetative height would be reduced significantly at a time when shading is needed. Vegetative reproduction as well as regrowth would be eliminated.

WILD HORSES

Reductions in livestock use should assure wild horses of having enough forage even in less favorable years. As a result, competition for forage and space between wild horses and livestock would be minimal.

VISUAL RESOURCES

Impacts would be the same as stated in Chapter 3 with the exception of those related to visual contrasts. Reductions in stocking rate would lessen vegetative contrasts between the A, B, and C treatment pastures in the short term.

In the long term, overall improvement of vegetation and watershed conditions would improve the visual landscape. However, VRM classes would remain unchanged.

Reductions in livestock use would lessen vegetative contrasts between "use" pastures and fenced exclusions, as well as along fencelines.

CULTURAL RESOURCES

Potential impacts resulting from livestock trampling would continue to accrue to 7,552 open archaeological sites, but stocking rate reductions would reduce the intensity of potential trampling on approximately 7,529 sites. Reduction in intensity does not mean that these sites would be free from impacts, as they would remain within the zone of potential trampling. Livestock pressures would be relieved on lands which, because of topography or present vegetation, are unfavorable for grazing. Intense trampling would continue to have an impact on sites at locations where livestock concentrate (see TABLE 3-15).

RECREATION RESOURCES

Although recreation use would be the same as shown in Chapter 3, the quality of the recreation experience could improve due to livestock reductions. Reductions would decrease livestock concentration areas. Wildlife habitat, watershed, and water-quality improvements would increase the quality of the recreation experiences.

WILDERNESS RESOURCES

Types of impacts would be the same as stated in Chapter 3. However, reduced stocking rates could cause an improvement in the resources upon which wilderness values are based.

LAND USES

Livestock Grazing

The primary impact of this alternative on livestock grazing would be the decrease in the amount of livestock use allowed (TABLE 8-10). Forage increases over the 15-year time period would partially offset these reductions. Calf and lamb weights, cull weights, and percent calf and lamb crop would increase slightly. All other impacts would be the same as described in Chapter 3.

Agriculture

Reductions in livestock use could change uses made on base ranches. However, it is not possible to predict these changes with any degree of accuracy.

SOCIO-ECONOMIC CONDITIONS

Impacts which differ significantly from those described in Chapter 3 or which are considered to be crucial to the analysis are discussed below.

Economic Conditions

POPULATION

Discernible increases or decreases would not result from implementation of this alternative.

EMPLOYMENT

Impacts on local/regional employment would be as described in Chapter 3.

INCOME

Regional Livestock-Related Income. Initially, implementation of this alternative would result in the reduction of livestock AUMs in the Systematic Grazing Area from a current authorized level of 45,859 AUMs to 17,722 AUMs (a decrease of 61 percent). Thereafter, during the full implementation period, forage conditions should improve on the allotments within the Systematic Grazing Area. However, except for the Duck Lake and Wall Canyon Allotments, AUMs made available for livestock would never approach (or surpass) existing levels since other forage uses (wildlife/wild horses) would be allocated subsequent increases in most cases. In effect, even after full implementation is reached, AUMs allocated to livestock would only total 23,939 AUMs (about 21,920 AUMs fewer than are now authorized, including the cancellation of grazing privileges on the Bicondoa Allotment).

This decrease would reduce sales generated in the economy from the livestock sector by an esti-

TABLE 8-10
LIVESTOCK USE BY ALLOTMENT

Allotment	Present Use (AUMs)	Initial Use (AUMs)	Use in 15 Years (AUMs)	Net Change in 15 Years (AUMs)
Selic-Alaska Canyon	1,239	376	485	- 754
Bare	14,968	5,910	6,935	- 8,033
Denio	1,633	794	1,064	- 569
Duck Lake	3,611	2,169	3,669	+ 58
Home Camp	9,761	4,681	5,711	- 4,050
Lower Lake	698	194	258	- 440
Tuledad	10,947	1,692	2,996	- 7,951
Wall Canyon	2,634	1,906	2,821	+ 187
Bicondoa	368	0	0	- 368
TOTALS	45,859	17,722	23,939	-21,920

mated $173,606 (21,920 AUMs X $7.92/AUM). Given a livestock multiplier factor of 1.74, this decrease in livestock AUMs could result in an estimated decrease of $302,074 in the regional economy. Included in this figure is a decrease of $64,234 in household incomes from existing levels ($173,606 X household coefficient of .37).

Allotment Livestock-Related Income. Implementation of Alternative 3 would have an impact on all the ranch operations within the Systematic Grazing Management Area. TABLE 8-11 indicates (by allotment) the discounted cost/revenue levels that would be most likely.

As this table shows, the ranchers' discounted costs for operating under the alternative for 50 years (at a 6⅛ percent interest rate) would be $1,671,479. This includes the ranchers' costs of maintaining existing facilities and those built during the two-year construction period, plus grazing fee payments. With the addition of the maximum decrease in value to the Bicondoa operation, estimated to be $21,000 (see Chapter 3), the total costs which the ranching sector would have to contend with for operating under Alternative 3 over a 50-year period would be $1,692,479.

The ranchers' discounted revenues from operating under this alternative for 50 years (at a 6⅛ percent interest rate) would be $3,269,258. This is the sum of the discounted gross revenues which would go to the permittees from consuming livestock forage as proposed.

The difference between those discounted costs and revenues shown in TABLE 8-11 is positive ($1,597,779). The use of a higher interest rate for discounting purposes (12 percent) decreases the apparent difference between discounted costs and revenues to $716,176 (not including costs incurred by Bicondoa). These totals indicate that the livestock industry as a whole would not be eliminated by implementing this alternative.

However, Alternative 3 might make Selic-Alaska Canyon Allotment inoperable. TABLE 8-11 indicates that discounted costs at the 6⅛percent interest rate would exceed revenues by about $35,000. With a 12-percent interest rate, the Selic-Alaska, Tuledad, Denio, and Lower Lake Allotments might all be inoperable.

Revenues in Tuledad Allotment would exceed costs at the lower interest rate (6⅛ percent) because cattle operations maintain a positive balance. Sheep operations at both the 6⅛ and 12 percent interest rates would suffer serious financial setbacks since the majority of livestock AUMs allocated to other forage uses would be taken from existing sheep AUMs. It would be anticipated that the forage now made available for an estimated 4,000 sheep would be reduced in this alternative to the point that less than 100 sheep would have available forage after full implementation.

To conclude, the present value of the changes in livestock production (relative to existing conditions) over a 50-year period at 6⅛ percent interest rate would be −$1,663,619 for sheep/cattle operators. These negative values would result not only from reduced lamb weights, but the reduction in AUMs made available for livestock forage under this alternative. This figure does not include those costs which would accrue to Bicondoa from termination of grazing privileges on that particular allotment, however.

Contract Construction-Related Income. Implementation of Alternative 3 would require the expenditure of $664,300 for range facilities on public lands within the Systematic Grazing Management Area. Area ranchers would be responsible for nearly one-tenth of the costs ($60,800). Because of this construction, an additional $66,430 in wages paid to construction labor could be added to the local/regional economy during the two-year construction period. In turn, this increase in wages would add an estimated $74,275 to household incomes in the region. The amount which would accrue to permanent residents of the region would be an estimated $7,845 since the initial amount ($66,430) was assumed to go to nonresident construction labor (see Chapter 3, Socio-Economic Conditions).

Annual Maintenance-Related Income. Annual maintenance costs would add an estimated $10,829 in wages to the local/regional economy (see TABLE 3-20, Socio-Economic Conditions). Using the household coefficient developed for the region, annual maintenance would therefore add an estimated $12,129 to personal incomes. Although not particularly significant, this redistribution of income in the form of wages is a positive impact on ranch laborers in the area. Small positive benefits may also be generated to the region's small businessmen via the multiplier effect.

Recreation-Related Income. Under Alternative 3, activity occasions might increase by 58 percent over existing levels.

TABLE 8-11 DISCOUNTED RANCHER COSTS/REVENUES UNDER ALTERNATIVE 3 WITH A 6-1/8 AND 12 PERCENT INTEREST RATE

Discounted Rancher Costs in Present Terms--6-1/8% Interest Rate

					Discounted Rancher Revenues				
Allotment	Improvement-Maintenance	Change In Grazing Fees 1/	Existing Level of Grazing Fees 1/	Total Discounted Rancher Costs by Allotment	Changed Quantity of Livestock Forage	Livestock Production (Increased Nos., Higher Weights) 2/	Cull Cows	Existing Level of Livestock Forage	Total Discounted Rancher Revenues By Allotment
Selic-Alaska Cy.	$ 68,621	$- 24,492	$ 38,386	$ 82,515	$- 85,723	$- 1,261	$ -	$ 134,353	$ 47,369
Tuledad	105,085	-260,864	339,158	183,379	-913,025	9,013 3/	780	1,187,053	283,821
Denio	86,395	- 20,432	50,593	116,556	- 71,511	32,218	-	177,076	137,783
Bare Ranch	228,478	-260,359	463,736	431,855	-911,258	240,584	4,468	1,623,075	956,869
Duck Lake	249,562	+ 13,776	111,875	375,213	+ 48,215	81,553	21,314	391,564	542,646
Lower Lake	17,812	- 14,297	21,625	25,140	- 50,038	11,866	5,221	75,688	42,737
Wall Canyon	37,314	+ 3,706	81,606	122,626	+ 12,970	79,763	6,363	285,621	384,717
Home Camp	167,951	-136,170	302,414	334,195	-476,594	180,134	111,329	1,058,447	873,316
	$961,218	$-699.132	$1,409,393	$1,671,479	$-2,446,964	$633,870	$149,475	$4,932,877	$3,269,258

Discounted Rancher Costs Computed at a 12% Interest Rate

Allotment	Improvement-Maintenance	Change In Grazing Fees 1/	Existing Level of Grazing Fees 1/	Total Discounted Rancher Costs by Allotment	Changed Quantity of Livestock Forage	Livestock Production (Increased Nos., Higher Weights) 2/	Cull Cows	Existing Level of Livestock Forage	Total Discounted Rancher Revenues By Allotment
Selic-Alaska Cy.	$ 35,751	$- 13,416	$ 20,579	$ 42,914	$- 46,955	$- 515	-	$ 72,025	$ 24,555
Tuledad	73,038	-143,502	181,819	111,355	-502,258	3,684 4/	359	636,365	138,150
Denio	46,875	- 11,661	27,122	62,336	- 40,815	13,169	-	94,929	67,283
Bare Ranch	122,491	-142,446	248,603	228,648	-498,560	98,336	2,054	870,112	471,942
Duck Lake	135,743	+ 11,320	59,975	207,038	+ 39,621	33,334	9,799	209,913	292,667
Lower Lake	11,776	- 7,832	21,625	25,569	- 27,412	4,850	2,400	40,576	20,414
Wall Canyon	20,886	+ 4,387	43,748	69,021	+ 15,355	32,602	2,925	153,118	204,000
Home Camp	96,815	- 75,701	162,120	183,234	-264,954	73,628	51,185	567,421	427,280
	$543,375	$-378,851	$765,591	$930,115	$-1,325,978	$259,088	$68,722	$2,644,459	$1646,291

1/ Assuming a charge of $2 per AUM per year.

2/ Net changes from existing levels of revenue for this alternative at a 6-1/8 percent interest rate are: $-1,809,813; at a 12 percent interest rate, the net change is $-1,127,075.

3/ Includes sheep losses of $89,404.

4/ Includes sheep losses of 36,543.

Source: Benefit/Cost Analysis, BLM Susanville District, 1977.

Due to the ambiguity in defining precisely what an activity occasion represents, and in the absence of data on its contribution to small economies such as Surprise Valley, no estimate of economic impacts which would accompany changes in activity occasions has been made for the local economy.

The projected increase in activity occasions is quite small in comparison to existing regional levels, however, which are an estimated 60 million.

Other Income Impacts. Additional employment within the Federal sector (BLM-SCS) could increase gross wages paid to individuals within the region by an estimated $30,000. It is assumed that these wages would positively impact personal income levels within the local/regional economy as those employed would probably work, live, and consume products within the region.

SOCIAL SUPPORT FACILITIES AND SERVICES

Impacts on social support facilities and services would be as described in Chapter 3.

PUBLIC FINANCE AND TAX BASE

With full implementation of the alternative, livestock numbers would decrease by an estimated 4,500 sheep and 2,600 cattle. Given the State's tax rate on livestock, implementation of this alternative would therefore decrease annual tax revenues by an estimated $9,850 after the fifteenth year.

In addition, property values could decrease by an estimated maximum of $1,254,000 by the fifteenth year (no inflation assumed). This figure reflects the termination of grazing privileges in the Bicondoa Allotment plus a decrease in livestock AUMs in other allotments such that, by the fifteenth year, forage that could not be consumed by livestock would account for an estimated 21,920 AUMs. Assuming that production would remain at this AUM level through the fiftieth year, and assuming that methods of calculating taxes were to remain constant for the next 15 years (25 percent of market value X $8 per $100 of assessed value), property taxes would decrease by about $10,600 each year as a result of implemention of this alternative, discounting the value of the forage decrease using a 12-percent interest rate.

Social Characteristics

Impacts of Alternative 3 would be very similar to those described in Chapter 3 with respect to the types of attitudes and behavior patterns which might develop once implementation is approved. Points of difference are discussed below.

Alternative 3 would appear to offer wildlife/wild horse proponents the advantage of allocating forage, that would normally go to livestock, to area wildlife and wild horses. Individuals who are more oriented toward preserving wildlife/wild horses, or who would advocate increases in their numbers, should accept this alternative. Fencing would still be considered a problem, as over 100 miles of fence would be constructed during a two-year period (see Chapter 3, impacts of such facilities on values held about fences in relationship to area wildlife/wild horses).

With regard to recreational uses, this alternative might be readily accepted by sportsmen most interested in consumptive pursuits, e.g., hunters, since game species common to the area would not have to compete as strenuously with livestock for forage as they do presently and their numbers might increase. However, additional numbers of harvestable game animals might create further competition between resident and nonresident sportsmen (see Chapter 3, Social Characteristics).

Livestock forage use would initially be reduced by 63 percent from existing levels. It would be anticipated that even 15 years after implementation of the grazing system, livestock would still be allowed about 21,000 AUMs less than they are currently allocated because any increases in forage would go primarily to wildlife/wild horses. Maintenance responsibilities of range facilities would be at the levels depicted in the Proposed Action. The BLM would have the key role in determining grazing schedules for each allotment. Because of these factors, it would be likely that Alternative 3 would meet stiff resistance from area permittees if implementation seemed likely.

Ranchers might feel forced to follow a given behavior pattern which would reduce current revenue levels for some and which would make others (sheep operators) inoperable.

Mitigation Measures

All measures delineated in Chapter 4 are applicable to this alternative. No additional measures are proposed.

Unavoidable Adverse Impacts

Unavoidable impacts with respect to cultural resources would be as described in Chapter 5, save that the intensity of livestock-related impacts would be reduced (though by an unquantifiable degree) on a predicted 7,529 archaeological sites.

Reduced livestock use would be an unavoidable adverse impact.

All other unavoidable adverse impacts identified in Chapter 5 are applicable to this alternative.

ALTERNATIVE 4—VARIETY OF GRAZING SYSTEMS

Grazing Management Proposal

Grazing would not be allowed on the Bicondoa, Selic-Alaska Canyon, or Tuledad Allotments or the western 4,893 acres of the Lower Lake Allotment or on the southern 53,511 acres of the Bare Allotment. Deferred grazing, at low stocking rates, would be implemented on Home Camp, Denio, and Duck Lake Allotments. Three-pasture rest-rotation systems would continue on the Wall Canyon and Bare Allotments. The eight allotments identified for custodial management in Chapter 1 would be unchanged under this alternative.

GRAZING TREATMENTS AND FORMULA

Cattle, under deferred grazing, would begin grazing when key species reach flowering stage. Grazing would terminate when proper use (TABLE 8-12) has been reached for key species. Cattle distribution would be achieved by herding as necessary and by salting and limited water development.

Rest-rotation grazing would follow the sequence of use and rest described in Chapter 1 for three-pasture systems with the following changes:

(1) Carrying capacity would be based on the combined capacity of the two pastures with least capacity.

(2) Grazing would begin on June 15 (the approximate date of flowering for key species).

(3) Grazing would terminate when proper use of key species has occurred on key areas.

STOCKING RATE

Stocking rates are based on SCS initial stocking rate guides for the lowest recommended stocking rate in less favorable years for each range site in accordance with its range condition class. Lands unsuitable for grazing due to unfavorable topography, soils, and vegetation were not used in stocking rate calculations.

ALLOCATION OF FORAGE

Forage would be allocated to deer and antelope to meet present demands. Wild horses would be allocated forage at recommended MFP population levels and livestock would be allocated remaining forage (TABLE 8-13). Future forage available due to range recovery would be allocated in accordance with MFP decisions.

GRAZING EXCLUSION AREAS

One 60-acre meadow in the Duck Lake Allotment, two miles of riparian area on Cottonwood Creek in the Bare Allotment, and 160 acres of waterfowl habitat at Woodruff Reservoir on the Bare Allotment would be fenced to exclude livestock.

FACILITIES TO IMPLEMENT THE ALTERNATIVE

Range facilities would include seven springs, nine reservoirs, and six wells (TABLES 8-14 and 8-15). To protect critical areas, 8.75 miles of fence would be included. Project designs would be as described in Chapter 1.

IMPLEMENTATION SCHEDULE

Implementation would be over a three-year period. Water projects would be completed during the first year and fencing would be completed during the second year. Livestock reductions would occur at a rate of one-third the stated reduction during each of the first three years. Grazing terminations in "no grazing" areas would occur in the second year.

Vegetative response in all allotments would be analyzed using the monitoring system described in Chapter 1.

Impacts of Alternative 4

VEGETATION

Systematic Grazing Management

ONE YEAR

Later turnout would provide increased carbohydrate storage in herbaceous species in the Treatment A pasture. In the Treatment B pasture, early maturing species would receive increased carbohydrate storage and late maturing species would receive complete carbohydrate storage. Complete carbohydrate storage would be provided in the Treatment C pasture. The A and B treatment pastures would receive lower degrees of

TABLE 8-12
PROPER USE FACTORS FOR KEY SPECIES

Allotment	Proper Use Factor (%)	Key Species
Denio	40	Idaho fescue
	50	Bitterbrush
Wall Canyon	50	Bluebunch wheatgrass
	40	Crested wheatgrass
Bare	50	Bluebunch wheatgrass
	50	Bitterbrush
	50	Mountain mahogany
Lower Lake	40	Bottlebrush squirreltail
Duck Lake	50	Bluebunch wheatgrass
	50	Bitterbrush
Home Camp	50	Bluebunch wheatgrass
	50	Bitterbrush
Tuledad	50	Bitterbrush
	50	Mountain mahogany

TABLE 8-13
ALLOCATION OF FORAGE--ALTERNATIVE 4

			AUMS ALLOCATED 1/					
Allotment	Current Authorized AUMs	Available AUMs	Deer	Antelope	Bighorn Sheep	Wild Horses	Livestock	Change In Livestock Use (AUMs)
Bicondoa	368	368	27	27	314			-368
Alaska Canyon	648	464	464					-648
Selic	591	506	506					-591
Tuledad	10,947	9,866	5,850	1,083		1,200		-10,947
Home Camp	9,761	9,612	864	540			8,208	-1,553
Denio	1,633	1,300	102	108			1,090	-543
Duck Lake	3,611	3,471	162	276			3,033	-578
Lower Lake	698	384	54	50			280	-418
Wall Canyon	2,634	2,899 (1,717)2/	81	208			1,717	-917
Bare	14,968	9,022	810	627		600	6,291	-8,677
TOTALS	45,859	37,8923/	8,920	2,919	314	1,800	20,619	-25,240

1/ AUM Calculation Ratios: 1 AUM = 4 Deer Unit Months
= 5 Antelope Unit Months
= 5 Bighorn Sheep Unit Months
= 1 Horse Unit Month

2/ Sum of AUMs of two pastures with least capacity: Livestock Reductions = 55 percent.

3/

Total AUM Available	37,892
Total AUM Allocated	34,572
AUMs Uncommitted	3,320

TABLE 8-14
FACILITIES AND EXCLUSIONS TO IMPLEMENT ALTERNATIVE 4

	RANGE FACILITIES				GRAZING EXCLUSIONS				
Allotment	Springs	Reservoirs	Wells	Fence (Miles)	Meadow (Acres)	Riparian (Mi./Ac.)	Waterfowl Habitat (Acres)	Antelope Winter Areas (Acres)	Total Acres Excluded From Livestock Grazing
Bicondoa									10,845
Alaska Canyon									4,665
Selic									4,124
Tuledad									162,705
Home Camp	1	2	3						
Denio			1						
Duck Lake	2	7		4.75	60				60
Lower Lake			2						
Wall Canyon	1								
Bare	3	—	—	4.0	—	2/100	160	53,511	53,771
TOTALS	7	9	6	8.75	60	2/160	53,511	236,170	

TABLE 8-15
COST OF FACILITIES TO IMPLEMENT ALTERNATIVE 4

Facility	Allotment	Project Number	Location	Costs	
Springs	Bare	173	T.38N., R.23E., Sec. 5, Middle ½	2,500	
		174	T.38N., R.23E., Sec. 5, NW	2,500	
		50	T.36N., R.21E., Sec. 6, SW	2,500	
	Duck Lake	210	T.28N., R.19E., Sec. 20, NW	2,500	
		81	T.39N., R.19E., Sec. 20, SW	2,500	
	Wall Canyon	175	T.39N., R.20E., Sec. 7, SW	2,500	
	Home Camp	179	T.39N., R.21E., Sec. 5, NE	2,500	
SUBTOTAL					17,500
Wells	Lower Lake	223	T.40N., R.17E., Sec. 26, NW	4,000	
		221	T.39N., R.18E., Sec. 21, Middle	4,000	
	Home Camp	216	T.40N., R.19E., Sec. 11, NE	4,000	
		217	T.40N., R.20E., Sec. 5, NE	4,000	
		218	T.40N., R.22E., Sec. 10, SE	4,000	
	Denio	219	T.39N., R.22E., Sec. 32, NE	4,000	
SUBTOTAL					24,000
Reservoirs	Home Camp	86	T.39½N., R.20E., Sec. 25, SW	12,220	
		207	T.39N., R.19E., Sec. 3	2,000	
	Duck Lake	102	T.39N., R.19E., Sec. 14, SE	3,485	
		209	T.37N., R.20E., Sec. 6, SE	3,600	
		100	T.38N., R.19E., Sec. 36, SW	2,710	
		211	T.38N., R.19E., Sec. 30, SW	4,000	
		83	T.39N., R.19E., Sec. 31, NW	3,766	
		158	T.38N., R.18E., Sec. 12, SW	6,653	
		110	T.38N., R.20E., Sec. 10	4,162	
SUBTOTAL					42,596
Fences	Duck Lake		T.39N., R.19E., Sec. 32-33	9,500	
	Bare		T.39N., R.23E., Sec. 30-31	2,000	
			T.37N., R.22E., Sec. 30-31	6,000	
SUBTOTAL					17,500
TOTAL					$101,596

1/ 8.75 miles at $2,000/mile.

utilization due to application of the proper-use factor. This would leave residual vegetation in each pasture. At the end of one year little change in range condition would be evident.

ONE CYCLE (3 YEARS)

Plant vigor improvement would begin to become evident due to reductions in utilization, later turnout, and rest from grazing. Residual vegetation would be present in all pastures and litter would increase. Slight increases in the density of perennial grasses and forbs would occur. Bitterbrush would show less use but no change in general condition. Slight improvement in the meadow types would be apparent; aspen condition would remain unchanged.

FIFTEEN YEARS

Noticeable improvement in range conditions would be expected in the Wall Canyon and Bare Allotments after 15 years following implementation of this alternative. Early-maturing grasses (such as Sandberg bluegrass and squirreltail) and forbs would receive adequate rest to complete carbohydrate storage every year. Later-maturing herbs (such as bluebunch wheatgrass and Idaho fescue) would receive adequate rest to complete carbohydrate storage in two of every three years; many individuals would receive adequate rest every year. Noticeable improvement in vigor and an increase in density of perennial grasses and forbs would be anticipated.

Response of browse species, such as antelope bitterbrush, would vary with proximity to livestock use areas. Bitterbrush individuals in less accessible areas, relieved of livestock grazing pressure, would noticeably improve in vigor. Individuals in or near concentration areas would continue to lose vigor. Intermediate responses would occur between these extremes, as a function of utilization pressure. The present downward trend of most bitterbrush ranges would be halted.

Livestock would continue to concentrate in the willow/Nevada bluegrass, Nevada bluegrass-sedge, and aspen habitat types; and anticipated impacts would be as described in Chapter 3. Conditions in the willow/Nevada bluegrass and Nevada bluegrass-sedge types would improve; but very little improvement would be anticipated in the aspen habitat type.

Deferred Grazing

ONE YEAR

Later turnouts, reduced grazing pressure and application of proper-use factors would allow slight increases in food reserve storage, increase in litter, less area impacted by grazing, and a reduction in utilization. No improvement would be evident in meadows, aspen stands, or browse after one year. General changes in range condition would be undetectable after one year except for reduced utilization.

SHORT TERM (3 YEARS)

At the end of three years, less accessible areas would show increases in plant vigor and diversity of forbs and slight increases in plant density. Litter accumulation would increase and early-maturing species would begin to show increased densities. Shrubs would not yet show condition change nor would meadows or aspen stands. Changes would be much more evident in the long term.

FIFTEEN YEARS

Range conditions would be expected to improve slightly and continue in an upward trend in most habitat types of the Home Camp, Denio, and Duck Lake Allotments after 15 years following implementation of this alternative. Deferment until flowering of bluebunch wheatgrass (Idaho fescue in Denio Allotment) would provide sufficient rest for early maturing species to restore carbohydrate reserves. Also, later-maturing species, such as bluebunch wheatgrass and Idaho fescue would have sufficient rest to nearly complete carbohydrate storage—many of these individuals would not be grazed until after their seed-ripe stage and would thus complete their carbohydrate storage. No rest would be provided from grazing of fall regrowth, however, and carbohydrate reserves would be lowered at that time. Thus, increased vigor and abundance of perennial grasses and forbs would be anticipated, but at a relatively slow rate. Increases in early-maturing species would be most evident.

Reduced stocking rates would relieve the less accessible land areas of grazing pressure and improvement in range conditions would be noticeable. Range trend in livestock concentration areas, particularly the aspen, Nevada bluegrass-sedge, and willow/Nevada bluegrass habitat types, would continue downward, however, and impacts would be similar to those described in Alternative 1.

Reduced livestock stocking rates would have effects on antelope bitterbrush similar to those described above in the discussion of three-pasture rest-rotation management but improvement would be slower.

Custodial Management Areas

Impacts on vegetation in custodial management areas cannot be anticipated because they would be directly dependent upon the livestock grazing management elected by the individual operators.

Grazing Exclusion Areas

Impacts on vegetation in the Bicondoa, Selic-Alaska Canyon, and Tuledad Allotments, the western 4,893 acres of the Lower Lake Allotment, and the southern 53,511 acres of the Bare Allotment would be as previously described for Alternative 2 and the livestock grazing exclusion areas of the proposed action (Chapter 3). Greatest improvement in range conditions would be expected in the Selic-Alaska Canyon and Tuledad Allotments. Improvement would be much slower in the Bicondoa Allotment and would not be expected to be evident in the exclusion areas of the Lower Lake and Bare Allotments. These anticipated rates of response are based on soil moisture and species composition relationships discussed in Chapter 3.

Facilities to Implement the Alternative

Impacts of construction and development of livestock facilities on vegetation would be as described for the proposed action. The acreages of land affected would be different; the seven springs would directly affect approximately 2.3 acres, the nine reservoirs would directly affect approximately 45.0 acres and destroy approximately 13.6 acres, and the 10.5 miles of fence would affect approximately 10.5 acres.

SOILS

Systematic Grazing Management

The impacts upon the soils of the habitat types in the Wall Canyon and Bare Allotments would be similar to those described in Chapter 3.

The grazing intensity would be reduced from heavy to moderate over the long term on the soils of all habitat types except HT-13, 26, and 27.

Deferred Grazing

The impacts upon the soils of HT-13, 26, and 27 would be similar to those described for Alternative 1. The grazing intensity would continue to be heavy on these three habitat types.

The impacts upon the soils of the other habitat types in the Deferred Grazing Areas would be similar to Alternative 3. The grazing intensity would be reduced from the present heavy to light/moderate on these soils.

Custodial Management Areas

Soil impacts in custodial management areas cannot be anticipated because they would be directly dependent upon the operators' livestock grazing management. No projections of vegetative responses or changes can be made.

Grazing Exclusion Areas

Soil impacts in the Bicondoa, Selic-Alaska Canyon, and Tuledad Allotments, the western 4,893 acres of the Lower Lake Allotment, and the southern 53,511 acres of the Bare Allotment would be as previously described for Alternative 2 and for the livestock grazing exclusion areas in Chapter 3.

Facilities to Implement the Alternative

Only 62 acres of soil would be permenantly removed from production because of the physical presence of the management facilities. Adverse impacts would thus be slight, overall.

WATER

Systematic Grazing Management

The Wall Canyon and Bare Allotments would have the same impacts as described in Chapter 3 and Alternative 3. The grazing would promote an increase in the efficiency of water use by vegetation. Surface runoff would be reduced. Water infiltration rates and interflow water would increase.

Deferred Grazing

Home Camp, Denio, and Duck Lake Allotments would be grazed each season. Grazing would start when key plant species reach a flowering stage; they would be moderately grazed the remainder of the season. Moderate changes would be expected in the hydrology because of increased litter and total vegetative ground cover. The decrease in bare ground caused by the increase of fibrous-rooted grasses would occur slowly.

Very light grazing pressure on the sagebrush would be expected to occur. Therefore, this system would help the sagebrush maintain itself and eventually increase.

Surface runoff would be reduced to some extent, and interflowing water and infiltration rates would increase slightly.

It is doubtful that 15 years would show substantial evidence of the meadow areas reestablishing their productivity and natural condition.

Water quality and consumptive use would remain the same as described in Chapter 2.

Custodial Management Areas

Impacts on water resources would be the same as those described in Chapter 3.

Grazing Exclusion Areas

The impacts in Bicondoa, Selic-Alaska Canyon, and Tuledad Allotments, the western 4,893 acres of the Lower Lake Allotment, and southern 53,511 acres of the Bare Allotment would be as previously described for Alternative 2 and for the livestock grazing exclusion areas in Chapter 3.

The hydrology in the higher precipitation areas would change first. The greater the precipitation the faster vegetative changes would occur, which would then cause ground cover to change enough to reduce surface runoff and increase the efficiency of water use. The Lower Lake and Duck Flat areas might never realize a definitive change in hydrology because of the lack of moisture.

Facilities to Implement the Alternative

The magnitude and nature of these facilities would have no expected influence on the watershed hydrology. Consumptive use and water quality would be expected to remain unchanged from the present.

ANIMALS

Terrestrial Animals

SYSTEMATIC GRAZING MANAGEMENT—ONE YEAR

Treatment A. Initiation of grazing about June 15 and termination of grazing after 50 percent utilization of key species would reduce forage competition between deer and livestock significantly. Deferment of grazing until about June 15 would provide forbs and grass for deer during spring and bitterbrush and mountain mahogany during fall and winter. Reduced stocking rates would decrease livestock forage demands and deer habitat distant from livestock waters would improve from lack of grazing.

Grazing deferment until June 15 would eliminate most late spring/early summer forage competition between antelope and livestock. Termination of grazing at 50 percent utilization of key species insures the availability to antelope of bitterbrush and other browse. Competition for water would occur but this would not be considered limiting in most years. Water would be available in the rest pasture or the seed-ripe pasture.

Livestock would concentrate on meadows after turnout and competition between sage grouse and livestock for forage and removal of cover would result. Negative impacts of nest destruction by trampling and competition for forbs in spring would be foregone due to deferred turnout.

Chukar would not be expected to be significantly affected.

Quail occur only marginally on public lands and generally inhabit pockets of private land adjacent to abandoned homesteads now used as temporary camps for livestock operations. No significant impacts would occur due to grazing management near these areas.

Waterfowl habitat is nonexistent on public lands in these allotments and therefore would suffer no impacts due to systematic grazing management.

Cover removal and forage competition would adversely affect small game in the Treatment A pasture. Deferred turnout and grazing termination would ensure the presence of cover and forage to partially meet small game species needs.

Maximum habitat values for nongame species would be available until about June 15 when cattle grazing would reduce cover and forage. Many species would have reproduced without disturbance, nest destruction, or cover removal due to livestock. Competition between nongame species and livestock for cover and forage would occur from June through the termination of grazing. Termination of grazing at a proper-use factor of 50 percent would ensure cover and forage for most species after grazing terminates. The response to this treatment would be extremely variable, however, depending upon cover, space, reproductive, and forage requirements of individual species.

Treatment B. All forage and cover would be available to deer until about August 1. From this date until proper use of key species (bitterbrush and mountain mahogany on Bare Allotment) occurred, competition for browse would result. Termination of grazing would occur at 50-percent utilization leaving 50 percent of the browse for deer.

Impacts on antelope would be similar to those due to Treatment A but all competition would be eliminated until approximately August 1 each year.

The effects of this treatment on sage grouse would be no nest disturbance, and increased forage and cover. Application of grazing about August 1 would result in the removal of cover and competition for forage. However, forage competition would be minimal since sage grouse, especially chicks, would be less dependent upon forbs and would be feeding on sagebrush without significant competition from livestock.

Chukar, quail and waterfowl would not be significantly affected.

With respect to small game, cover removal and forage competition would not occur until about August 1. Reproduction in most species could therefore be carried out without negative effects.

Impacts on nongame species would be the same as under Treatment A but competition would occur from about August 1 until proper use of key species.

Treatment C. No competition between livestock and wildlife would occur. Maximum habitat benefits to wildlife species would therefore accrue limited only by habitat quality.

No threatened or endangered species would be affected by systematic grazing management after one year.

One Cycle. Deer would generally respond to one cycle of the grazing system through improved condition as a result of a greater abundance of spring, fall, and winter forage. Survival of fawns would be expected to increase and adult mortality would decrease. These increases would not significantly affect the population after one cycle, although improvement would be expected. Habitat condition would remain unsatisfactory but the rate of downward trend would be reduced.

The provision of antelope spring forage (forbs) in every pasture until about June 15 or later would minimize the negative effects of livestock forage competition. Antelope kidding grounds would be disturbed less by livestock and the additional forage would improve the condition of antelope allowing an increase in fawn survival. Browse availability during summer, especially bitterbrush, would help improve animal condition prior to winter. Survival of young and adults would therefore increase an estimated 10-15 percent.

Slight improvement in the willow/Nevada bluegrass and Nevada bluegrass-sedge types would improve habitat conditions for sage grouse dependent upon meadows in early spring and summer. The absence of livestock in all pastures until at least June 15 will improve sage grouse production through elimination of nest disturbance and trampling. This combination of factors would increase sage grouse production and survival an estimated 5 percent. Population increases would therefore occur but would not be significant.

Small game populations would increase slightly due to increased cover, forage, and reduced disturbance. The response by individual species would be variable but generally positive.

Cover and forage for nongame species would increase on most upland sites. Meadows and riparian areas would show slight improvement and nongame species use would increase. These habitat types would still be in poor condition but with an upward trend. Aspen would continue in a downward trend in most sites. Red-tailed hawks, goshawks, and other raptors dependent on this habitat would be generally unchanged.

No impacts on threatened or endangered species are known.

Fifteen Years. Deer population increases due to improved fawn survival and decreased mortality rates resulting from habitat improvement would be expected to be about 25-50 percent.

Antelope populations would have improved forb availability in spring and bitterbrush availability in summer and fall. Population increases would be estimated to equal those of the Likely Tables, 50 miles west of these allotments. A 50-150 percent increase would be possible in 15 years.

Sage grouse may increase an estimated 15-20 percent due to improved nesting success, chick survival, and habitat recovery.

Small game would generally increase as habitat improvement occurred. This improvement would be variable and cannot be determined.

Nongame species would have improved habitat conditions. Moderate population increases would be expected but the response after 15 years would be extremely variable.

No significant impacts would accrue to threatened or endangered species.

DEFERRED GRAZING

One Year. Deferment of grazing until approximately June 15 would provide increased availability of grasses and forbs to deer. Provision of succulent forage during spring green-up would improve their physical condition. Improved condition of pregnant does in the third trimester of pregnancy would result in improved fawn health and survival. Improved condition of yearlings and remaining adults would result in decreased mortality in these age classes. Termination of grazing after 50- percent utilization of bitterbrush and mountain mahogany would ensure fall and winter fall forage. This combination of factors would tend to allow an increase in fawn production and would improve the physical condition of all age classes.

Disturbance of antelope kidding grounds would be reduced by the elimination of grazing and grazing management activities during spring. Increased availability of forbs would result from grazing deferment until flowering of bluebunch wheatgrass or Idaho fescue. Because forbs constitute the major source of spring forage, increased forb availability would result in improvement of physical condition during that season. Livestock reductions would result in a decrease in the amount of antelope range significantly impacted by livestock. Grazing deferment until about June 15 would also increase grass production. A decrease in the amount of range impacted and an increase in grass production would delay livestock consumption of browse and would result in less bitterbrush consumption by livestock during summer. Competition for bitterbrush, an important summer browse, would thus be reduced. Improvements in animal condition, fawn survival, and decreased mortality would be the net result.

Disturbance of sage grouse strutting grounds and nesting areas would be reduced. More forbs would be available during spring, improving chick survival because they are heavily dependent upon forbs and other succulent vegetation produced on meadows. After June 15, meadows would be heavily utilized and their condition would retrograde to approximately current conditions. Although reductions of livestock would occur, livestock would continue to concentrate on meadows. Sage grouse nest destruction might be reduced and chick survival might increase slightly. Overall, sage grouse response would be limited.

Chukar would not be significantly affected due to their preference for talus slopes and rocky areas where livestock impacts are minimal.

Remnant quail populations near homesteads and abandoned ranches would not be significantly effected.

No waterfowl habitat exists in the allotments considered for this grazing treatment.

Present rabbit and hare populations would not be expected to change significantly due to grazing management. Lack of vegetation removal during spring would increase food and cover. Termination of grazing upon determination of proper use would provide approximately 20-30 percent more forage and cover than is presently available. Additional forage and cover might locally benefit individuals but population increases and decreases are characteristic of lagomorphs. The net effect on small game would not be significant.

Most nongame birds would have improved nesting cover. Lark sparrows would be adversely affected due to their nesting preference for bare and eroded areas. Increased cover would improve habitat for grasshoppers, beetles, caterpillars, ants and other insects which would provide increased food supplies for nongame bird species in the big sagebrush association group.

Vegetative changes would be expected to occur slowly and would not have significant impacts on nongame birds, by the end of one year. Impacts on small mammals and reptiles are unknown.

Fifteen Years. Habitat improvement on spring and winter use areas would have a positive effect on deer. Improved animal condition, and fawn production and population increases would result. Provision of spring forage and at least 50-percent availability of browse for deer would provide substantial relief from current limiting factors. Although specific browse stands might react variably, habitat conditions would generally exhibit an upward trend and some areas might achieve satisfactory condition.

Increased spring forage, decreased interspecific competition on kidding grounds between antelope and livestock, decreased human disturbance from grazing-related activities and improved summer forage availability would result in a general population increase after 15 years. Antelope have increased from 400 to 1,300 animals in 15 years in the adjacent area. A similar magnitude of increase might be possible in the study area.

After 15 years, sage grouse would show slight population increases.

Chukar and quail would not be significantly affected after 15 years of deferred grazing.

Small-game populations would be expected to increase moderately after 15 years. Population increases would be greatest on habitat types distant from grazing concentrations. Response would be highly variable from species to species. Rabbits and hares would continue to demonstrate population fluctuations independent of the effects of grazing.

Increases in population sizes and diversity of nongame species would be expected in the big sagebrush, greasewood, and mountain mahogany association groups. Improved cover, vegetational species diversity, livestock reductions, and modified season of use would benefit most nongame birds. Lark sparrows, however, would be expected to decrease as eroded areas and bare ground, which are preferred nesting habitat, would be reduced. The net effect after 15 years would generally be positive.

Of the 25 species of raptors present, all but the goshawk, Cooper's hawk, and sharp-shinned hawk would be expected to maintain relatively stable populations. Heavy dependence on aspens and the declining condition of this habitat might result in vegetative impact on these species.

The long-term effect on small mammals and reptiles is unknown.

CUSTODIAL MANAGEMENT AREAS

Impacts on wildlife in custodial management areas cannot be predicted due to variable and undefined livestock use.

GRAZING EXCLUSION AREAS

All habitat types affected would improve although at variable rates. In the Selic and Alaska Canyon Allotments deer summer range would provide improved cover and increased forbs, grasses, and browse. Riparian and aspen habitat types would respond rapidly providing more abundant, higher-quality habitat for game and nongame species. A relatively rapid rate of habitat improvement would occur on these allotments due to their mesic character.

In the Tuledad Allotment, all habitat types would improve in 15 years. Improvement would be more or less rapid depending upon the soil moisture character of each habitat type. Deer would respond favorably on summer, intermediate, and winter ranges. Additional cover and a 80-90 percent increase in forage availability would allow improvement in the condition, production, and survival of deer. Antelope would be similarly impacted. Population increases of 100 percent in 15 years are possible. Significant (300 percent) increases have been obtained in the adjacent area.

Aspen, Nevada bluegrass-sedge, and willow/Nevada bluegrass habitat types would show maximum rate of improvement. Nongame and game species use would increase and resident populations would increase. An increase in use by migrants would also occur. Aspen condition would improve and reproduction would occur. Additional nesting habitat for raptors and other nongame birds would not result during the next 15 years. However, perpetuation of aspen habitat values would result from improved condition and reproduction success. Waterfowl nesting habitat (HT-23 and 3) would develop more optimum cover. Production would be expected to increase about 200 percent due to improved nesting conditions, reduced trampling losses, and reduced predation caused by cover removal by livestock.

In the western portion of the Lower Lake and the southern part of the Bare Allotments, habitat improvement would occur but at a slow rate due to xeric conditions. In the excluded portion of the Bare Allotment, all forage, cover, and water would be available for antelope year-round, a critical antelope area as identified by the Nevada Department of Fish and Game. This would relieve any competitive disadvantages to antelope and result in an unknown positive effect. Small game and nongame species would benefit slightly from the accumulation of cover and the additional forage.

FACILITIES TO IMPLEMENT THE ALTERNATIVE

Impacts of these facilities on terrestrial animals would be the same as described in Chapter 3.

The long-term effects of construction of facilities would be minimal. Additional dependable water would be available in 18 locations, constituting localized habitat improvement which would be partially offset by increased livestock use in the proximity of these projects.

Aquatic Animals

This alternative proposes that:

(1) No grazing be allowed along 12 miles of public shoreline in the Tuledad and Selic-Alaska Canyon Allotments;

(2) A three-pasture rest-rotation grazing system be continued on 2 miles of public streamside in the Wall Canyon Allotment;

(3) Deferred grazing, at low stocking rates, be implemented on 5.25 miles of shoreline in the Duck Lake Allotment.

The beneficial effects of no grazing on fisheries have been described previously in Alternative 2. The impacts on fisheries of a three-pasture rest-rotation grazing system have been discussed in detail in Chapter 3.

Deferred grazing in the Duck Lake Allotment would result in only slight improvement in the condition of the aquatic community. Livestock would continue to concentrate on the later-maturing bank flora and would have sufficient time to consume the majority of available plants before proper use would be achieved on key upland species. Benefits would result from a reduction in mechanical damage due to fall regrowth.

WILD HORSES

Systematic Grazing Management

ONE YEAR

The impacts of Treatment A on wild horses would be competition for forage, water, cover, and space at a level of approximately one-half current levels for one month less in the Hog Mountain pasture, the only one inhabited by horses in the Bare Allotment.

The impacts of Treatment B would be similar to the competition in Treatment A, however, this competition would occur for three months.

Treatment C would provide complete rest and elimination of livestock competition for that grazing season.

In every year an improvement in horse condition and slight improvement in recuitment would be expected to occur.

ONE CYCLE (3 YEARS)

After one cycle the cumulative effects of Treatments A, B, and C would be provision of more forage and less livestock competition, thereby improving animal health and survival.

FIFTEEN YEARS

Noticeable improvement in overall range conditions would be expected after 15 years following implementation. An increase in the density of perennial grasses and forbs would be anticipated, resulting in improved condition, production, and survival of wild horses.

Deferred Grazing

There is no wild horse use in proposed deferred grazing areas; therefore, there would be no impacts on wild horses.

Custodial Management Areas

No wild horses occur in custodial management areas.

Grazing Exclusion Areas

In the Tuledad Allotment, livestock grazing would be eliminated and no project construction would occur. Impacts on wild horses would be beneficial since there would be little competition for forage and space. There would be no problems regarding forage availability or quantity or freedom of movement.

Facilities to Implement the Alternative

Two spring developments (Projects 173 and 174) proposed for the wild horse area of the Bare Allotment would require 0.2 mile of fencing. Any fencing in wild horse areas, especially near water, creates a hazard; however this hazard would not cause a significant impact.

VISUAL RESOURCES

Systematic Grazing Management

Impacts of systematic grazing on visual resources would be as described in Chapter 3.

Deferred Grazing

No perceptible changes in visual resources would occur after one or three years. At the end of 15 years, areas distant from water would show changes which would improve the visual character of these areas by providing diversification in color and texture. A change in VRM class would not be expected, however.

Custodial Management Areas

Impacts under this form of management are unknown.

Grazing Exclusion Areas

Any livestock conflicts with visual resources would be eliminated. All Class II lands would be excluded from grazing.

Facilities to Implement the Alternative

Impacts related to fence construction and spring, reservoir, and well/windmill development would be the same as described in Chapter 3. None of these facilities would be in Class II lands.

CULTURAL RESOURCES

Under this alternative, cultural resources would receive no categories of impact not identified qualitatively in Chapter 3. The quantitative impacts of specific components, however, would be unique to this alternative.

Systematic Grazing Management and Deferred Grazing

Since impacts after one year or after three years (short term) are identical except for magnitude, and because systematic grazing management and deferred grazing have similar impacts, they are treated together.

Livestock grazing would continue to have an impact on cultural resources to an unquantifiable degree throughout the Duck Lake, Wall Canyon, Home Camp, and Denio Allotments, and in the grazed portions of the Lower Lake and Bare Allotments. A predicted 5,514 open sites could be potentially impacted to varying degrees by diffuse trampling, arrayed in the following allotment distributions:

Denio—311
Wall Canyon—500
Bare—1,898
Lower Lake—126
Duck Lake—748
Home Camp—1,931

In addition, 82 archaeological sites, including six *National Register* eligible properties, occur at known sites of cattle concentration and would continue to receive more intense trampling than the majority of sites (see TABLE 8-16 for site types and allotment distributions).

Reductions in stocking rates would reduce the intensity of trampling from its present level, but the degree of reduction in impact is unquantifiable.

Predicted improvements in range conditions in the long term in the Wall Canyon and Bare Allotments and in most habitat types in the Home Camp, Duck Lake, and Denio Allotments would benefit cultural resources in the long-term by retarding erosion and stabilizing soils.

Custodial Management Areas

Impacts on the 53 archaeological sites predicted to lie in custodial allotments would be as described in Chapter 3.

Grazing Exclusion Areas

Termination of grazing in the Tuledad and Selic-Alaska Canyon Allotments, and in portions of the Lower Lake and Bare Allotments would not impact cultural resources adversely and, by removing the forces of trampling, would constitute a significant improvement over the present situation. A large number of the 2,135 open archaeological sites predicted to lie in these allotments would stand to benefit, especially those located where livestock concentrate.

Facilities to Implement the Alternative

The qualitative impacts of water developments would be as described in Chapter 3. Of those proposed under this alternative, the construction of one spring and one reservoir could partially disturb two archaeological sites.

The construction of 10.75 miles of fence could adversely impact an unpredictable number of cultural sites in the manner described in Chapter 3.

RECREATION RESOURCES

Systematic Grazing Management

Short-term impacts would be insignificant.

Long-term impacts would be the same as stated in Chapter 3. However, as stocking rates would be lower than the current rate, there could be a corresponding decrease in the extent of livestock concentrations. A slight increase in the quality of experience for recreation activities such as sightseeing, camping, hunting, fishing, and other pursuits could result.

Deferred Grazing

In the allotments to be grazed under deferred grazing, proper movement of livestock to insure uniform utilization could result in impacts similar to those stated above. The potential for increased quality over the long term would be greater for areas with deferred grazing management than for areas under systematic grazing management.

Custodial Management Areas

Impacts on recreation resources would be the same as described in Chapter 3.

Grazing Exclusion Areas

It would be anticipated that elimination of grazing and range facilities on these areas would not cause a sudden influx of new recreation occasions, but the quality of the recreation experience for the users could be improved.

Facilities to Implement the Alternative

Impacts on recreation resources would be the same as described in Chapter 3.

TABLE 8-16
KNOWN CULTURAL RESOURCES WHICH WOULD BE IMPACTED BY GRAZING AND WATER DEVELOPMENTS UNDER ALTERNATIVE 4

Impacts by Allotment	Villages	Base Camps	Temp. Camps	Lithic Scatters	Quarries	Rock Shelter	NRHP[1]
Denio							
Trampling[2]			4	2	2	1	1
Wall Canyon							
Trampling			2	3	4		
Bare							
Trampling			10	8	4		2
Lower Lake							(District)
Trampling		8/4 [3]		5			1
Duck Lake							(District)
Trampling	1 [4]	5	2	6	1		1
Water Development[5]				(#209) 1			
Home Camp							
Trampling		2	7	4	1		1
WaterDevelopment[5]			(#179) 1				

[1] Sites or districts eligible for nomination to National Register of Historic Places.

[2] Sites which would be impacted by intense livestock trampling.

[3] Eight sites on public lands, four on private lands.

[4] On private land.

[5] Sites which would be directly impacted by spring/reservoir projects. Parenthetic numbers indicate specific water developments.

WILDERNESS RESOURCES

Systematic Grazing Management and Deferred Grazing

Impacts would be the same as those stated in Chapter 3. However, as stocking rates would be lower than the current rate, there would be a corresponding improvement in wilderness values.

Custodial Management Areas

The custodial grazing allotments would not conflict with potential for wilderness study areas.

Grazing Exclusion Areas

Impacts on wilderness resources would be the same as stated in Chapter 3 for the areas to be excluded from grazing.

Facilities to Implement the Alternative

Impacts of facilities on wilderness values would be as stated in Chapter 3.

LAND USES

Livestock Grazing

SYSTEMATIC GRAZING MANAGEMENT

In each year during the first cycle, one-third the stated grazing reductions would be applied. Herd size and meat production would be reduced. Calf and lamb weights, death loss, cull weights and percent calf crop would be as shown in Chapter 3.

The later turnout date of June 15 would require livestock to be fed hay or other forage during the spring months when previously foraged on public land. Total hay requirements, however, might not exceed existing levels since herd sizes would be reduced.

After one cycle, the entire stated reduction would be imposed. Impacts on livestock would be the same as shown in Chapter 3.

Grazing would be reduced by about 150,000 AUMs over 15 years. Increased calf weights, cull cow weight, and percent calf crop would be expected due to reduced intraspecific forage competition.

DEFERRED GRAZING

In the first year, later turnouts would require additional hay to be fed to cattle during spring. Fewer numbers would be turned out and increased herding and range supervision would be required. Slight improvement in livestock condition and production would be anticipated from increased forage production due to grazing deferment. One-third the necessary reductions would be imposed.

By the third year, the full 6,200 AUMs of livestock grazing reduction would be imposed. The benefit of increased forage due to deferment, stated above, year one, would continue as a positive impact on condition of remaining livestock.

In the long term, grazing use would be reduced by about 37,000 AUMs. Animal performance would be improved due to increased forage production and decreased competition.

CUSTODIAL MANAGEMENT AREAS

Impacts on livestock would be the same as those described in Chapter 3.

GRAZING EXCLUSION AREAS

Effects of excluding livestock from these areas are discussed below, under Economic Conditions.

FACILITIES TO IMPLEMENT THE ALTERNATIVE

Impacts on livestock grazing would be the same as described in Chapter 3.

Agriculture

The impacts of this alternative on agriculture would be the same as those described for Alternative 1.

SOCIO-ECONOMIC CONDITIONS

Economic Conditions

POPULATION

Populations within the study area should remain fairly static under this alternative. This assumption is based upon two concepts: (1) that those ranches that would have their grazing privileges terminated would continue to operate other ranches in the region and/or be absorbed by other operators; and (2) that any losses in population due to ranch families being forced to other locales would be offset by the need for additional ranch labor (cowboys). Overall population trends for the region should not be impacted by Alternative 4 but should continue as projected in the "No Action" Alternative.

EMPLOYMENT

With regard to employment, Alternative 4 could result in each allotment requiring the services of up to two additional ranch hands (with the exception of the Selic-Alaska Canyon, Tuledad, and Bicondoa Allotments). This additional labor would be considered necessary since grazing would be terminated when proper livestock forage use

TABLE 8-17

DISCOUNTED RANCHER COSTS/REVENUES UNDER ALTERNATIVE 4 WITH 6-1/8 AND 12 PERCENT INTEREST RATE

Discounted Rancher Costs in Present Terms--6-1/8 Percent Interest Rate					Discounted Rancher Revenues				
Allotment	Improvement-Maintenance	Change In Grazing Fees 1/	Existing Level of Grazing Fees 2/	Total Discounted Rancher Costs by Allotment	Changed Quantity of Livestock Forage	Livestock Production (Increased Nos., Higher Weights)	Cull Cows	Existing Level of Livestock Forage	Total Discounted Rancher Revenues by Allotment
Denio	$ 46,121	$- 15,823	$ 50,593	$ 80,891	$- 55,381	$ 32,218	$ -	$ 177,076	$ 153,913
Bare Ranch	114,239	-252,848	463,736	325,127	-884,967	240,584	4,468	1,623,075	983,160
Duck Lake	124,681	- 16,843	111,875	219,713	- 58,950	81,553	21,314	391,564	502,183
Lower Lake	11,694	- 12,181	21,625	21,138	- 42,632	11,866	5,221	75,688	50,143
Wall Canyon	37,315	- 26,721	81,606	92,200	- 93,525	79,763	6,363	285,621	278,222
Home Camp	100,240	- 45,254	302,414	357,400	-158,390	180,134	111,329	1,058,447	1,191,520
	$434,290	$-369,670	$1,031,849	$1,096,469	$-1,293,845	$626,118	$148,695	$3,611,471	$3,159,141
Discounted Rancher Costs if Computed at a 12-Percent Interest Rate:									
Denio	$ 24,726	$- 8,080	$ 27,122	$ 43,768	$- 28,279	$ 13,169	$ -	$ 94,929	$ 79,819
Bare Ranch	61,246	-129,114	248,603	180,735	-451,898	98,336	2,054	870,112	518,604
Duck Lake	66,844	- 8,601	59,975	118,218	- 30,102	33,334	9,799	209,913	257,004
Lower Lake	6,269	- 6,220	21,625	21,674	- 21,769	4,850	2,400	40,576	26,057
Wall Canyon	20,005	- 13,645	43,748	50,108	- 47,757	32,602	2,925	153,118	140,888
Home Camp	53,741	- 23,109	162,120	192,752	- 80,880	73,628	51,185	567,421	611,354
	$232,831	$-188,769	$563,193	$607,255	$-660,685	$255,919	$68,363	$1,936,069	$1,633,726

1/ Assuming a charge of $2 per AUM per year.

2/ Net Change from existing level of revenues for this alternative at a 6 1/8 percent interest rate are: $-519,032; at a 12 percent interest rate the net change is $-336,403.

Source: Benefit/Cost Analysis, BLM Susanville District, 1977.

would be reached; without fences, the only method of assuring proper use would be through herding.

Even though this additional labor requirement would consume an estimated 72 manmonths of labor (6 allotments × 2 part-time employees), the resultant impact on employment levels within the agricultural sector would be insignificant—the agricultural sector for Modoc County currently employees over 1,000 individuals.

Some additional employment in the construction sector would occur from implementation of this alternative. Given the fact that 8.75 miles of new fence would be constructed, along with eight wells, nine reservoirs, and seven springs, additional manmonths required to complete the projects within the projected two-year construction schedule would consume an estimated 18 manmonths (see method of calculation, Chapter 3, Socio-Economics). This construction would not reduce regional unemployment levels, however, since such construction would probably be contracted out to nonresident labor forces.

Monitoring and supervision by the BLM would consume an additional six manmonths of labor per year above existing levels.

INCOME

Regional Livestock-Related Income. Implementation of this alternative would result in reduction of livestock AUMs from a current authorized level of 45,859 AUMs to 20,619 AUMs in the Systematic Grazing Area (a decrease of 55 percent). This decrease would reduce the economic activity in the livestock sector by an estimated $199,900 (25,240 AUMs decrease × $7.92 per AUM). Given a livestock multiplier factor of 1.74, this decrease in livestock AUMs could result in an estimated decrease in the regional economy of $347,826. Included in this figure is a decrease in household incomes of $73,963 ($199,900 × household coefficient of .37).

Allotment Livestock-Related Income. Implementation of this alternative would have an impact on all the ranch operations within the Systematic Grazing Management Area. TABLE 8-17 indicates the discounted cost/revenue levels that would be anticipated. The operator's discounted costs for operating under the alternative for 50 years at a 6⅛-percent interest rate would be $1,096,469. This figure includes maintenance costs for existing and proposed facilities, plus grazing fee payments. The costs associated with cancelling the grazing privileges on the Bicondoa, Selic-Alaska, and Tuledad Allotments should also be added, however. For Bicondoa, it would be is estimated that the maximum decrease in value that would be suffered by the operation if grazing privileges were to be terminated is $21,000 (Chapter 3, Socio-Economics). Termination of grazing privileges in the Tuledad Allotment would have a similar adverse effect; the maximum decrease in value to this operation would be estimated to be $635,000 (10,947 AUMs of livestock use × $7 per AUM × 12-percent interest rate capitalized for a 50-year period). Following the same procedure for the Selic-Alaska Canyon Allotment, the maximum decrease in value to this operation would be estimated to be $72,000 (1,239 AUMs × $7 per AUM × 12-percent interest rate capitalized for a 50-year period).

By adding costs incurred by the Bicondoa, Selic-Alaska, and Tuledad Allotments to the discounted cost figure given in TABLE 8-17 for the 6⅛-percent interest rate, the total costs which the ranching sector would have to contend with for operating under this alternative over a 50-year period is reached—$1,824,469.

The operators' discounted revenues from operating under this alternative for 50 years (at a 6⅛-percent interest rate) would be $3,159,141. This figure is the sum of the discounted gross revenues which would go to the permittees from consuming livestock forage as proposed.

The difference between those discounted costs and revenues shown in TABLE 8-17 is positive ($2,062,672). The use of a higher interest rate for discounting purposes (12 percent) decreases the apparent difference between discounted costs and revenues to $1,021,605 (not including costs incurred by the Bicondoa, Selic-Alaska Canyon, and Tuledad Allotments). These totals indicate that the livestock industry (as a whole) would not be eliminated by implementing this alternative. However, the three existing allotments mentioned above would be terminated.

Contract Construction-Related Income. Implementation of this alternative would require the expenditure of $101,596 for range facilities, of which area permittees would incur costs of approximately $13,000 (TABLE 8-18). As the majority of this construction would be accomplished by out-of-area laborers, it is estimated that only 10 percent of total expenditures might

TABLE 8-18
ESTIMATED COSTS OF FACILITIES BY YEAR OF EXPECTED COMPLETION PLUS MAINTENANCE

Type of Development	Total Units	Per Unit Cost ($)	No.	Year 1 Cost ($)	No.	Year 2 Cost ($)	Total Annual BLM Maintenance Costs ($)	Total Annual Rancher Maintenance Costs ($)
Water								
Springs	7	2,500	7	17,500				
Wells	6	4,000	6	24,000				
Reservoirs	9	4,732	9	42,596				
Fences								
Divisional	8.75 miles	2,000			8.75	17,500		
Totals				84,096		17,500	1,750 1/	7,535 1/
Income Effects on Local Households 2/				8,410		1,750	525 3/	2,260 3/

1/ Derived by assuming a maintenance rate schedule based upon the life of a particular project. For water developments, a 10-year life was anticipated; for fences a 20-year life. These maintenance charges solely indicate maintenance of the proposed facilities--they do not consider monies currently charged for maintenance of other existing facilities.

2/ Estimate of that proportion of monies spent in construction (personal consumption expenditures) that would actually stay within the region. If it is assumed that 20 percent of total costs would be for wages, then it must also be assumed that only about 50 percent of this 20 percent figure would actually remain in the region (motel rooms, meals, gas, etc.). This assumption is made since out-of-area workers would be the principal contract recipients.

3/ Assuming that 30 percent of maintenance costs would be for wages and that local labor would be employed.

actually stay within the region. An additional $10,160 in wages paid to construction labor could be added to the local/regional economy during the two-year construction period. In turn, this increase in wages would add an estimated $11,359 to household incomes within the region. The amount accruing to permanent residents of the region would be an estimated $1,199, since the initial expenditure ($10,160) would have all been to nonresident construction labor (see Chapter 3, Socio-Economics, for methods of calculation).

Annual Maintenance-Related Income. Assuming a replacement schedule of 20 years for fences and 10 years for the water improvements, maintenance costs on the projected facilities (over and above existing maintenance costs) would total $9,285 per year. Using the household coefficient developed for the region, annual maintenance would add an estimated $3,119 to personal incomes ($2,785 × household coefficient of 1.12).

Although not particularily significant, this redistribution of income to ranch labor is a positive impact, which (through the concept of multiplier effects) might also benefit other economic sectors in the region. Such expenditures, however, drain additional capital from area ranch operators.

Recreation-Related Income. If Alternative 4 were implemented, activity occasions might increase by 58 percent over existing levels. As recreational use is estimated in activity occasions, however, an estimate of economic benefits which might accrue to local residents from such land uses has not been undertaken due to the lack of data on how such activity occasions contribute to smaller economies like that in Surprise Valley.

Other Income Effects. Implementation of this alternative would require the employment of additional BLM personnel to assess the impacts of grazing under conditions set forth in the alternative. It would be estimated that six manmonths would be required for this monitoring, thereby increasing gross wages paid to individuals within the region by an estimated $6,000. This increase, although insignificant when compared with total wages paid within the region, would positively impact personal income levels within the local/regional economy.

SOCIAL SUPPORT FACILITIES AND SERVICES

No additional facilities and services would be required under this alternative.

PUBLIC FINANCE AND TAX BASE

With full implementation of the alternative, livestock numbers could decrease by an estimated 5,000 sheep and 2,946 cattle. Given the State's tax rate on livestock, implementation of this alternative would therefore decrease tax revenues by an estimated $11,057 annually after the fifteenth year.

In addition, property values would decrease by an estimated maximum of $1,464,000 (no inflation assumed). This figure reflects termination of three present allotments and a decrease on the remaining allotments of 12,686 livestock AUMs by the third year, continued production at that level through the fiftieth year, and discounting back using a 12-percent interest rate.

Assuming that methods of calculating taxes were to remain constant for the next 15 years (25 percent of market value × $8 per $100 of assessed value), property taxes would decrease by about $29,440 annually as a result of implementing this alternative.

Social Characteristics

For recreationists, the alternative would appear to offer many positive benefits, which could induce support for its implementation. Many interest groups and individuals oppose fences because they can interfere with recreation or hinder wildlife and wild horse movements. Fencing of public lands under this alternative would be kept to a minimum. Grazing would be completely terminated in some allotments and reduced in others. This, in turn, might reduce the competition for available forage between livestock and other uses. As such, area wildlife and wild horses should be positively impacted.

For some area ranchers, however, this alternative would spell severe economic and social disruption. For example, the Bicondoa, Selic-Alaska, and Tuledad Allotments would be closed to grazing. The operators of these three allotments, would have to either find other pastures elsewhere, develop their own base properties to offset the loss of Federal range, or reduce their operating scale to that which their base properties and other forage sources can now support. The adverse effects on property values and on an operation's economic survival were discussed and quantified previously.

Social position within the community is thought to rest with one's ability to maintain a particular lifestyle or tradition, such as ranching. As the operators of those allotments which would be closed to grazing would be hardpressed to continue in the livestock business, it would be likely that they would oppose implementation, since area ranchers would lose a crucial element of their particular lifestyle—self determinism— as a result of major AUM reductions on the Federal range or, in some cases, complete termination. Moreover, in this particular alternative, there would be no trade-off between monetary gains to offset loss of certain management prerogatives.

Because herding would be mandatory, this alternative might be opposed by those permittees who would be allowed to continue operating on the public lands within the study area. Area operators might never be convinced that herding would be a more practical method of controlling livestock movements than fencing, because good cowboys are scarce.

If implemented, this alternative might also consolidate rancher opinions because of conflicts which might arise between them and other interest groups who now use or would plan to use the public lands within the study area. Moreover, area ranchers within the study area might be joined by other ranchers in the region in an attempt to block implementation. Ranchers are a tightly knit group, and those located outside the study area might feel that such land-use proposals should be stopped now, not at some later date when their own allotments might be considered. The ranchers might feel that the BLM is proposing the first step toward total exclusion of livestock from the Federal range.

Mitigation Measures

Measures delineated in Chapter 4 with respect to visual and recreation resources are applicable to this alternative where the impacts resulting from the proposed systematic grazing system and range facilities are similar to those in Chapter 3.

Each of the mitigative measures enumerated in Chapter 4 for cultural resources is appropriate under this alternative. Specifically, Measure 2 will be implemented for the six *National Register* eligible properties which would suffer intense livestock trampling; Measures 26 and 27 will be applied to the water developments which could impact two archaeological sites; Measure 23 will be applied to the 10.75 miles of proposed fenceline; and Measures 3 and 4 will be applied to all proposed facilities not presently accessible by road. Measure 9 will be performed for all areas under custodial allotment.

The cultural resource monitoring and inventory program will be implemented as proposed in Chapter 4, save that nongrazing areas will be omitted from inventory. Instead, inventory of the Home Camp, Wall Canyon, Duck Lake, and Denio Allotments and grazed portions of the Lower Lake and Bare Allotments will be pursued at the minimum rate of 2 percent of the area per year.

No other measures to mitigate impacts of this alternative have been identified.

Unavoidable Adverse Impacts

Adverse impacts listed in Chapter 5 relating to visual and recreation resources would also apply to this alternative.

The following additional adverse impacts would result: Limited air pollution from herding to achieve even utilization of vegetation, increased vegetative growth in the additional no grazing areas could permit wildfires to be more prevalent, resulting in air pollution.

Under this alternative, archaeological sites throughout all allotments in which grazing was allowed would continue to receive impacts from the passage of livestock. The effects of trampling and livestock-related erosion could extend to a large number of the predicted 5,567 potentially impacted sites, and would unquestionably affect many so-far undiscovered *National Register* eligible properties. All such impacts, however slight, would be permanent, and all lost information irretrievable.

All other adverse impacts described above, under ''Impacts of this Alternative,'' cannot be mitigated and are thus considered unavoidable.

ALTERNATIVE 5—COMBINATION OF EXISTING ALLOTMENTS

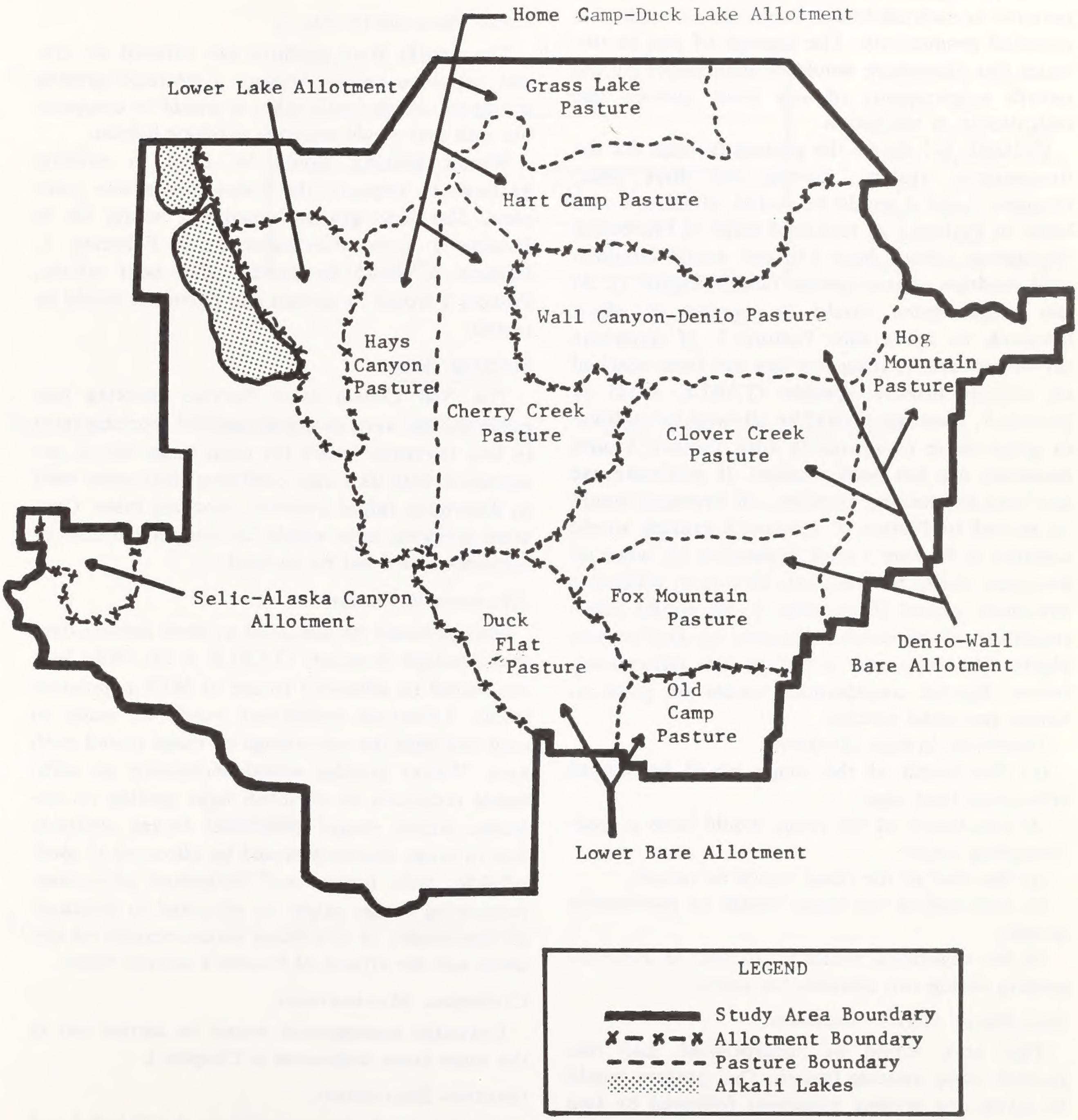
Grazing Management Proposal

This alternative would combine existing allotments to form one-, two-, and four-pasture grazing systems (FIGURE 8-4):

Allotment	*System*
Home Camp—Duck Lake	Four-pasture system.
Denio—Wall—Bare	Four-pasture system.
Selic—Alaska Canyon	One-pasture three-treatment system.
Lower Bare	Two-pasture winter grazing system.
Lower Lake	One-pasture winter grazing system.

FIGURE 8- 4

Alternative-5 Allotments



Other management proposals include custodial management, grazing exclusions, prescribed burning, and facilities to implement the alternative.

SYSTEMATIC GRAZING MANAGEMENT

Home Camp-Duck Lake and Denio-Wall-Bare Allotments

A four-pasture rest-rotation grazing system would be applied to these two allotments. The pastures in each allotment would have comparable potential productivity. The amount of rest or use under this alternative would be determined by the growth requirements of key plant species and their degree of utilization.

FIGURE 8-5 shows the grazing formula for the four-pasture system. During the first year, Pastures 2 and 4 would be rested. Grazing would begin in Pasture 1 at mid-boot stage of bluebunch wheatgrass (about May 15) and would continue until seedripe of this species (about August 1). At this stage, gates would be opened to allow livestock to move into Pasture 3. If moderate (41-60 percent) grazing use has not been reached on critical browse species (TABLE 8-19) in Pasture 1, livestock would be allowed to continue to graze there concurrently with Pasture 3 until moderate use has been attained. If moderate use has been reached by seedripe, all livestock would be moved to Pasture 3. Livestock grazing would continue in Pasture 3 until September 15, when all livestock would be removed. However, a flexible two-week period (September 1-30) would allow regulation of livestock utilization on key browse plants. Moderate use would be the determining factor. Special consideration would be given to woody perennial species.

Therefore, in each allotment:

(1) One-fourth of the range would be grazed after grass boot sage;

(2) One-fourth of the range would have a seed-trampling cycle;

(3) One-half of the range would be rested;

(4) One-half of the range would be moderately grazed;

(5) No vegetation would be subject to livestock grazing during two consecutive years.

Selic-Alaska Canyon Allotment

This area would be incorporated into one pasture using existing fences. This pasture would be given one grazing treatment followed by two consecutive years of rest. During the grazing treatment, livestock would enter at mid-boot stage of bluebunch wheatgrass. Grazing would continue until moderate utilization of key browse species has been reached, at which point livestock would be removed. September 30 would be the latest date that grazing would be allowed.

Lower Lake Allotment

Light winter grazing would be allowed in this allotment from November 1 to February 1.

Lower Bare Allotment

The Lower Bare pastures are situated on crucial antelope winter range. Livestock grazing would be allowed only when it would be compatable with and would improve antelope habitat.

Winter grazing would be used in existing pastures to improve the forb-grass-browse complex. The first grazing treatment would be in Pasture 1 from November 1 to February 1. Pasture 2 would be rested. The next winter, Pasture 2 would be grazed and Pasture 1 would be rested.

Stocking Rates

The Soil Conservation Service stocking rate guide for the average recommended stocking rates in less favorable years for each range site in accordance with its range condition class were used to determine initial livestock stocking rates. Constant stocking rates would be used; a pyramid of numbers would not be allowed.

Allocation of Forage

Forage would be allocated to meet present deer and antelope demands (TABLE 8-20). Wild horses would be allocated forage at MFP population levels. Livestock reductions would be made to conform with the percentage of range rested each year. Winter grazing would necessitate an additional reduction to establish light grazing on antelope winter range. Additional forage available due to range recovery would be allocated to meet wildlife, wild horse, and watershed objectives. Remaining forage might be allocated to livestock as determined by utilization measurements on key areas and the effects of livestock around water.

CUSTODIAL MANAGEMENT

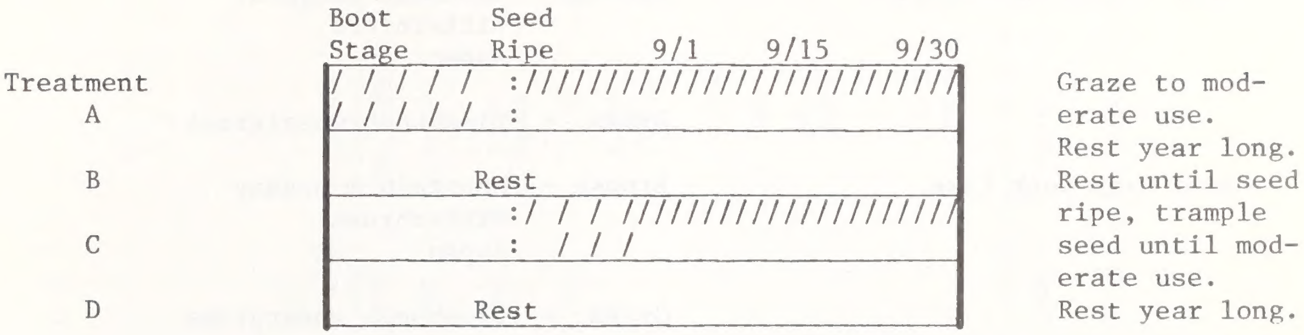
Custodial management would be carried out in the same areas delineated in Chapter 1.

GRAZING EXCLUSIONS

Grazing would be excluded on the Tuledad and Bicondoa Allotments.

FIGURE 8-5

Alternative 5 - Grazing Formula



Schedule

Pasture	1st Year	2nd Year	3rd Year	4th Year
1	A	D	C	B
2	B	A	D	C
3	C	B	A	D
4	D	C	B	A

Legend

: :	Seed Ripe
/ / / / / / / / / / /	Graze
//////////	Graze until moderate use.

TABLE 8-19
KEY SPECIES

Allotment	Key Species	
Wall Canyon-Bare-Denio	Browse -	Mountain mahogany Bitterbrush Aspen
	Grass -	Bluebunch wheatgrass
Home Camp-Duck Lake	Browse -	Mountain mahogany Bitterbrush Aspen
	Grass -	Bluebunch wheatgrass

TABLE 8-20
FORAGE ALLOCATIONS UNDER ALTERNATIVE 5

Allotment	Current Autho. Livestock Use (AUMS)	AUMS Available by Pasture	Deer Demand (AUMS)	Antelope Demand (AUMS)	Potential Bighorn Sheep Demand (AUMS)	Wild Horse Demand (AUMS)	Allowable Livestock Use (AUMS)1/	Net Change in Livestock Use (AUMS)	Livestock Reduction (%)
WALL CY.-BARE-DENIO	17,148	16,687	993	525		600	4,718	-12,430	72
Wall Cy.-Denio		5,088	183	316					
Clover Creek		5,615	259	94					
Hog Mountain		2,374	178	59		600	1,537		
Fox Mountain		3,610	373	56			3,181		
TULEDAD	10,947	12,181	5,850	1,083		1,200	0	-10,947	100
HOME CAMP-DUCK LAKE	13,372	13,794	1,026	815			5,378	- 7,994	60
Hays Canyon		3,596	393	158			3,045		
Hart Camp		2,583	0	250			2,333		
Cherry Creek		3,597	393	158					
Grass Lake		4,018	240	249					
LOWER LAKE	698	505	54	50			200	- 498	71
LOWER BARE	2,087	2,993		408			596	- 1,491	71
Duck Flat		1,492		300			596		
Old Camp		1,501		108					
ALASKA CANYON									
Selic-Alaksa-Canyon	1,239	1,204	400				268 2/ 804 3/	- 971	78
BICONDOA	368	368	27	27	314		0	- 368	100
TOTALS	45,859	47,732	8,350	2,908	314	1,800	11,160	-34,699	76

1/ The allotment total is derived from the combined capacity of the two smallest pastures in a four-pasture system, or the smallest pasture in a two-pasture system.

2/ Average annual use.

3/ Actual use every third year.

PRESCRIBED BURNING

Spring burning and livestock management can accelerate achievement of resource objectives. Under this alternative, fire would be applied to areas occupied by big sagebrush range sites, HT-3, 5, 6, 7, 9, 11, 13, 16, 18, 20, 23, and 24, about 10 percent of the study area. TABLE 8-21 indicates the number of acres in each allotment to be burned and the costs.

Timing is the most critical aspect of burning. Burning of sagebrush is most effective, with minimal impacts on desirable species, in early spring (February and March), due to favorable soil moisture conditions and plant dormancy. To conduct a successful burn, relative humidity should be 60 percent or less and the wind should be blowing at least 8 miles per hour or greater and gusting. Regrowth will take place in the weeks following burning.

Burning would be attempted in small patches of 1 to 20 acres to increase diversity and create the "edge effect." About 600 to 700 pounds of fire fuel per acre would be needed (Seardahl and Sylvester, 1974). Low sagebrush and roads would provide natural fuel breaks to accomplish adequate fire control.

The yearly burning would occur in the rest pasture of a four-pasture rest-rotation system (FIGURE 8-6). This proposed four-pasture treatment would give adequate rest after a burn if livestock would be kept off the burn until late fall. Herding would help keep grazing animals from concentrating on the burn and damaging seedlings.

FACILITIES TO IMPLEMENT THE ALTERNATIVE

Water developments and methods of development would be the same as proposed in Chapter 1. A total of 41 miles of new fence would be built and 39 miles of existing fence would be removed. Fence design and construction would be as described in Chapter 1. Costs of these facilities are shown in TABLE 8-22).

Impacts of Alternative 5

VEGETATION

Systematic Grazing Management

Presently available vegetative data used to compute initial stocking rates cannot substitute for an intensive range survey to estimate grazing capacities. However, reduction in livestock grazing pressure (AUMs) coupled with safeguards to prevent livestock grazing pressure from exceeding specified limits would provide a conservative initial stocking rate from which adjustments could be made as improvement in range conditions indicate.

FOUR-PASTURE GRAZING SYSTEM

Vegetative impacts of the four-pasture grazing management systems would affect the Home Camp-Duck Lake and Denio-Wall-Bare Allotments. Impacts of the "use" and "seed-ripe" treatments would be similar to those described in Chapter 3, but would differ in degree. Short-term and long-term impacts would also be similar but would differ in rate of improvement in range condition and the effects on antelope bitterbrush. One year of rest followed by one year of "moderate" use and another year of rest would be expected to satisfy the growth requirements of bitterbrush and provide for a corresponding increase in vigor. Adequate rest would also be provided for bitterbrush reproduction, with seed being produced in the early summer of the seedripe treatment on leader growth of the previous year ("rest" treatment). Reduced livestock grazing pressure (AUMs) would also be expected to result in decreased utilization pressure on bitterbrush during the use and seedripe treatments. Reproductive success of all forage species would be benefitted by the year of rest provided before the seedripe year. Moderate use during the seedripe treatment would also leave a ground cover of litter, thus creating a microclimate favorable for seedling success.

Aspen communities would serve as livestock concentration areas during the use and seedripe treatments, and impacts similar to those described in Chapter 3 would be anticipated. Successful aspen reproduction would be expected in the moister communities, however.

Improvement in range conditions would be very noticeable within 15 years following implementation of this alternative. Changes in species composition would be much the same as described in Chapter 3 but would differ in rate of improvement.

THREE-TREATMENT GRAZING SYSTEM

Vegetative impacts would be anticipated to be beneficial for the Selic-Alaska Canyon Allotment. Two years of rest following one year of moderate livestock grazing would provide adequate rest for all forage species (including antelope bitterbrush)

FIGURE 8-6
Prescribed Burning Formula

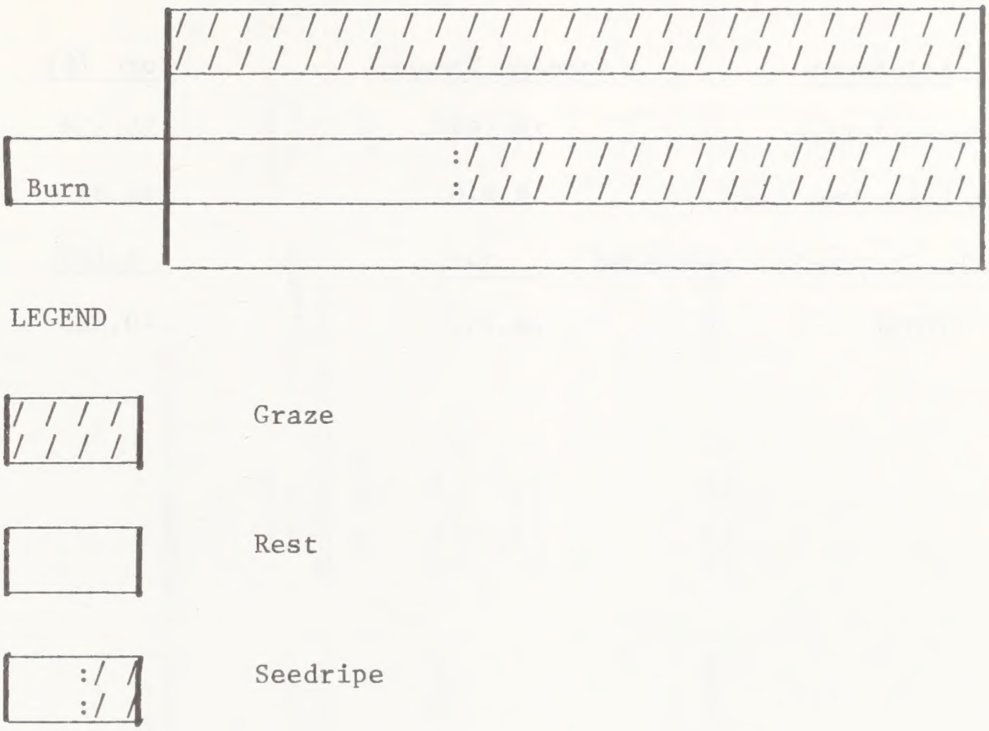


TABLE 8-21
ACREAGES TO BE BURNED AND COSTS OF BURNING BY ALLOTMENT

Allotment	Acreage Treated	Cost ($)
Denio-Wall-Bare	16,159	24,238
Duck Lake-Home Camp	9,910	14,865
Alaska Canyon-Selic-Tuledad	748	1,122
TOTAL	26,817	40,225

TABLE 8-22
COSTS OF FACILITIES AND PRESCRIBED BURNING TO IMPLEMENT ALTERNATIVE 5

Allotment	Springs (No./Total $)	Reservoirs (No./Total $)	Wells (No./Total $)	Pipelines (Mi./Total $)	Pasture Fences (Mi./Total $)	Cattleguards (No./Total $)	Exclosure Costs ($)	Prescribed Burning ($)	Total Costs
Selic-Alaska Canyon					5/5,000 1/		4,000	1,122	10,122
Home Camp-Duck Lake	16/28,100	15/65,700	4/16,000	14/28,000	37/74,000 10/10,000 1/	6/12,000	7,900	14,865	256,565
Denio-Wall-Bare	6/10,700	3/15,700			4/8,000 24/24,000 1/		5,300	24,238	87,938
Lower Lake									
Lower Bare			2/8,000						8,000
TOTAL	22/38,8000	18/81,400	6/24,000	14/28,000	41/82,000 39/39,000 1/	6/12,000	17,200	40,225	362,625

1/ Miles of fences to be removed and costs of removal.

to restore carbohydrate reserves and increase vigor. The proposed conservative stocking rate would provide a buffer in wildlife-livestock competition relationships to make such an anticipation reasonable. Aspen communities would continue to serve as livestock concentration areas, but successful aspen reproduction would be anticipated in most stands. Utilization of aspen root sprouts during the use treatment would not result in total consumption of all shoots that have been provided two years of rest from livestock grazing pressure. Within two or three grazing cycles such shoots would grow beyond the reach of livestock.

Very noticeable improvement in range conditions would be anticipated within 15 years. Changes in species composition would be similar to those described for the three-pasture grazing systems described in Chapter 3, except as described above, but would differ in rate of improvement.

TWO-PASTURE WINTER GRAZING SYSTEM

Vegetative impacts would be anticipated to be beneficial. "Light use" during one out of two winters would stimulate twig production of browse species. Grasses and forbs would be minimally affected, since grazing has its least effect on herbs during winter dormancy. Nevertheless, improvement in range conditions would be expected to be very slow due to the present species composition and soil moisture relationships discussed in Chapter 3.

ONE-PASTURE WINTER GRAZING SYSTEM

Vegetative impacts of this alternative would be anticipated to be as described above for two-pasture winter grazing. Wildlife forage demands are not as great in the Lower Lake Allotment as in the Bare Allotment. The net effects of less wildlife utilization and the lesser rest provided from livestock grazing would be expected to result in similar vegetative responses in these allotments.

Custodial Management

Impacts on custodial management areas would be as described in Chapter 3.

Grazing Exclusions

Vegetative impacts would be as described for the livestock grazing exclusion areas in Chapter 3 and for Alternative 2 (No Grazing) combined.

Facilities to Implement the Alternative

Impacts on vegetation of the construction and development of range facilities would be as described in Chapter 3; however, 39 acres would be affected by fence construction and 24 acres affected by fence removal.

Prescribed Burning

Vegetative changes anticipated to result from prescribed burning would result in impacts improving range conditions. Woody perennials would be temporarily eliminated from the burned areas, while herbaceous perennials, particularly grasses, would not be adversely affected from the reduced interspecific competition. Three years of rest during the growing season would be provided for species with carbohydrate storage completed by the seed-ripe date of bluebunch wheatgrass. Initial responses would be evident in perennial grasses, forbs, and crown-sprouting shrubs, such as rubber rabbitbrush. Site-adapted species, such as big sagebrush, would eventually become reestablished but in proportions more similar to site potentials. Other species such as Sierra juniper would be effectively controlled with fire management.

The impacts of the prescribed burning program would thus be anticipated to center around hastening improvement in range conditions. Response would be similar to those described for the three-pasture rest-rotation grazing systems in Chapter 3 but would differ in rate of herbaceous response. Crown-sprouters would be successfully reestablished, while others, such as big sagebrush, would be increasing in abundance after 15 years following the prescribed burn.

SOILS

Systematic Grazing Management

FOUR-PASTURE GRAZING SYSTEM

The impacts after one year and over the long term for the use and seed-ripe treatments would be similar to those described in Chapter 3. However, the adverse impacts for the short term would be somewhat less because the soils would receive additional rest during the first cycle. Grazing would be reduced from presently heavy to moderate intensity over both the short term and long term.

THREE-TREATMENT GRAZING SYSTEM

Two years of rest following one year of moderate grazing intensity would lessen the adverse impacts upon erosion, sediment yield, cover, surface permeability, and runoff over the first year and the short term. This would be particularly true of the Hapgood soils of HT-26. Grazing would be reduced from presently heavy to light/moderate intensity.

TWO-PASTURE WINTER GRAZING SYSTEM

The anticipated impacts of this alternative upon erosion, sediment yield, cover, runoff, and permeability would be beneficial over one year, the short term, and long term. Grazing would be reduced from presently heavy to light intensity. The detrimental effects of trampling and compaction would be eliminated because grazing would take place when the ground is frozen. Also, grazing when the ground is frozen would have no adverse impacts upon erosion, sediment yield, cover, surface permeability and runoff. The Duck Flat and Old Camp pastures of the Lower Bare Allotment would be affected by this alternative.

ONE-PASTURE WINTER GRAZING SYSTEM

The anticipated impacts on soil of this alternative would affect the Lower Lake Allotment. They would be similar to those described above for the two-pasture winter grazing system.

Custodial Management

Impacts would be the same as those described in Chapter 3.

Grazing Exclusions

The impacts of this alternative upon the soils would be as described for the livestock grazing exclusion areas in Chapter 3 and for Alternative 2 (No Grazing). The Tuledad and Bicondoa Allotments would be affected by this alternative. Grazing intensity would be reduced from heavy to none.

Facilities to Implement the Alternative

Because of the physical presence of the management facilities, 206 acres of soil would be permanently removed from production. In addition, impacts might result in increased soil loss and erosion due to vegetation removal, soil disturbance, and compaction in these areas. However, due to the small area involved and potential benefits to various resources, these impacts would be minimal.

Prescribed Burning

Prescribed burning would have some adverse impacts upon phases of the Boulder Lake, Weimer, Disabel, Jesse Camp, Crutcher, McConnel, Hapgood, Newlands, Home Camp, Zorravista, Buntingville, Campone, Hussa, Welsh, Hartig, Mendeboure, Four Star, Mascamp, Powley, Hartcamp, and Schamp soil series. Burning would cause a loss of plant nutrients (sulfur, nitrogen, and phosphorus) from the soils on 26,817 acres. Burning might also create a nonwettable soil-surface condition by the formation of hydrophobic substances (Debano, 1973; Debano, et al., 1970), especially under dry conditions on droughty, coarser-textured soils on steep south slopes. Erosion, sediment yield, cover, runoff and surface permeability would be adversely affected over the short term. Long-term impacts would be nonexistent because these effects would be temporary (2-3 years). The Mendeboure, Hartig, and Zorravista soils of HT-11, 16, and 18 would especially be affected. Timing of the burning during early spring when the soils would be moist would probably offset most of these adverse impacts.

WATER

Systematic Grazing Management

All livestock grazing management systems in this alternative would have substantially reduced stocking rates. In actuality, the reductions in livestock numbers would cause outlying areas (those which are higher and away from water) to be ungrazed.

None of the livestock facilities would change watershed hydrology conditions.

FOUR-PASTURE GRAZING SYSTEM

The hydrologic conditions would be similar to those described in Chapter 3.

The total cover would increase, resulting in increased evaporation losses and reduced surface runoff. The infiltration rates and reduced evapotranspiration could increase the quantity of interflowing water necessary to restore the valley meadows. Areas previously utilized heavily by livestock would have increased infiltration rates and evapotranspiration losses. The outlying ungrazed areas would have a rapid response initially, but eventually the vegetative conditions would tend to stagnate rather than move toward site potential. This near stable condition could occur within 15 years. The grazed area could reach site potential much faster with respect to surface runoff, interflowing water, and infiltration rates.

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THREE-TREATMENT GRAZING SYSTEM

In the Selic-Alaska Canyon Allotment, the plant cover would increase; the topography lends itself to complete grazing by sheep and cattle. Therefore, the vegetative change would result in an increase in the fibrous-rooted grasses, thus, increasing infiltration rates and reducing sagebrush to maximize interflowing waters. The change would be more rapid with heavy grazing than with moderate grazing. Surface runoff would be minimized and a high efficiency in vegetative use of moisture would be expected to occur.

ONE- AND TWO-PASTURE WINTER GRAZING SYSTEMS

These systems would be implemented in the low foothills with less than 8 inches of precipitation. No significant impact would be expected on the watershed hydrology. Changes, if any, would be beyond 15 years.

Custodial Management

Impacts would be the same as those described in Chapter 3.

Grazing Exclusions

The hydrologic impacts would be as described in Chapter 3 and Alternative 2 (No Grazing).

Facilities to Implement the Alternative

The facilities necessary for livestock grazing would cause no change in the watershed hydrology.

Prescribed Burning

The 26,817 acres to be burned are scattered, thus there would be no major impact on conditions in large watersheds. Small watershed areas would have vastly changed hydrologic conditions. Initially, surface runoff, water infiltration rates, and evapotranspiration conditions would be adversely impacted. The bare ground would be increased, making the area vulnerable to increased surface runoff until new vegetation would become established. Sagebrush, juniper, and other taprooted plants would be nearly eliminated, reducing evapotranspiration losses from the interflow waters.

Water infiltration rates would be reduced initially, yet they would be increased with the reestablishment of the native perennial grasses. The single greatest benefit to increase the efficiency of water use would be the removal of sagebrush, juniper, or rabbitbrush (xerophytic plants) from the plant community. The result could help increase the quantity of interflowing water by as much as 13 percent (Leaf, 1975), which would result in the rehabilitation of sensitive meadow areas.

Water quality would also be expected to increase as interflow waters increased. This would be exhibited in the streams and springs associated with the local areas treated.

ANIMALS

Terrestrial Animals

SYSTEMATIC GRAZING MANAGEMENT

Systematic grazing management will affect approximately 494,900 acres on 71 percent of the study area.

No significant impacts of systematic grazing management in either the long term or short term, would be expected on threatened or endangered species.

Four-Pasture Grazing System. During Treatment A, adverse impacts on deer would be the same as those described in Chapter 3 but competition between livestock and deer would be greatly reduced due to livestock reductions, deferment of turnout until boot stage of grass, use of only one-half of the range each year, and removal of livestock from the range after moderate use is reached. Decreased competition for spring forbs and grasses would improve physical condition of does and result in better survival of young. Decreased livestock numbers and removal of stock after moderate use would assure that a supply of bitterbrush and other browse forage would be available to carry deer through the winter and decrease mortality.

Adverse impacts of Treatment A on antelope would be as described in Chapter 3, but to a much lesser degree. Grazing under this system would greatly reduce competition between livestock and antelope due to the later turnout date and removal of livestock after moderate use. Adequate supplies of early spring grasses and forbs and summer and fall bitterbrush would be assured.

The later turnout date under Treatment A would greatly reduce or eliminate trampling and disturbance of sage grouse and quail and their nests. Reduced stocking rates would slightly lessen grazing pressure around meadow complexes but, because livestock concentrate in these areas, impacts would be similar to those described in Chapter 3.

Impacts on waterfowl during Treatment A would be similar to those described in Chapter 3 because livestock would concentrate on areas of waterfowl nesting habitat regardless of reduced stocking rates. Later turnout of livestock would eliminate nest disturbance of early nesters such as Canada geese.

With respect to nongame species, grazing under Treatment A would reduce vegetative food and cover and also reduce the productivity of ground-nesting birds and surface-nesting rodents through exposure or trampling of nests. Food and cover reductions would decrease reproduction and adult animal survival. Reduction of livestock numbers, deferred spring grazing, and removal of stock after moderate use would dampen the degree of these negative impacts.

No competition between livestock and wildlife species would occur during Treatments B and D. Wildlife would be limited only by habitat capability. Impacts would be the same as those described in Chapter 3 except a larger acreage would be rested under this treatment each year because of the four-pasture system.

Impacts of Treatment C on deer and antelope would be the same as those for Treatment A except there would be no competition with livestock for spring forbs and grasses. All important sage grouse and quail habitat components would be free from livestock use during the nesting and brooding periods under Treatment C.

During this same time residual waterfowl nesting cover would be present due to the previous year's rest; livestock disturbance or nest destruction would be eliminated. The Treatment C pasture would have the highest waterfowl production because it would combine a previous year's rest with rest during the nesting season.

Impacts of Treatment C on nongame species would be the same as those described in Chapter 3.

After one cycle, because of the proposed livestock reductions, deferment of use until "boot" stage, and establishment of moderate livestock use, the amount of spring, fall, and winter forage for deer and antelope would increase. Fawn survival would be expected to decrease and adult mortality would decrease. The downward trend in population would be expected to be reversed after the first cycle. The decrease in competition with livestock and the improvement of the willow/Nevada bluegrass and Nevada bluegrass/sedge habitat types important for sage grouse and quail reproduction would allow for the growth of the sage grouse and quail populations.

After the first cycle, elimination of grazing in two out of four years would allow residual emergent and bank vegetation to accumulate and attract more waterfowl nesting pairs and to decrease susceptibility to predators which would allow more birds to be produced. Few acres of waterfowl habitat occur in four-pasture grazing system area so only a slight increase in birds would be expected.

The grazing system would provide increased food and cover for most nongame species after one cycle, allowing them to increase slightly. Dry aspen sites would not be expected to improve under this system, therefore nesting habitat for red-tailed hawks, goshawks, and other raptors dependent on this habitat type would remain the same, and bird numbers would not change.

The long-term vegetative conditions expected should decrease adult deer mortality and increase fawn survival. The resulting increase in deer populations expected as a result of these changes and of livestock use patterns would be estimated at 40-60 percent.

Long-term impacts on the antelope populations would be the same as those described in Chapter 3 with the exceptions that competition with livestock for spring forage would be less and bitterbrush would respond better. It would be estimated that a 75 to 150 percent increase in antelope would be possible.

Long-term impacts on sage grouse, chukar, quail, waterfowl and nongame species would be similar to those described in Chapter 3, but with slightly better response of habitat and population. A moderate increase in populations could be expected.

Big sagebrush vegetation associations, which are good deer habitat, would be included in the Home Camp-Duck Lake Allotments. In particular, Hays Peak and Boulder Mountain are very important deer areas. In the long term, moderate use in two pastures in this allotment each year would not adversely affect available deer forage.

The small aspen patches in each pasture would be adversely impacted from grazing, which would have an impact on raptors and other wildlife which use this habitat type. The degree of adverse impact is unknown due to the variability of moisture in aspen habitat types.

Antelope occur in all four pastures in this allotment. The low sagebrush vegetation association is the center of their activity. Spring competition would occur in 25 percent of the allotment each year.

The greatest antelope densities would occur in Pastures 2 and 4. Pasture 4 would be important during both winter and spring. There would be no competition for winter forage. Long-term spring competition would be expected to be slight.

Sage grouse would also be hampered by this spring condition. The reduction in livestock use and delayed spring turnout dates would help minimize this adverse impact.

In the Denio-Wall-Bare Allotment, the impacts on wildlife would be similar in this allotment to those of the Home Camp-Duck Lake Allotment and would be minimized by the same grazing constraints. Fox Mountain and Cherry Creek pastures would contain the most important deer habitat.

Seasonal migration habits of deer in this allotment would necessitate that each pasture provide both succulent spring forage and winter browse in order to limit impacts on deer. Deferred spring grazing, complete rest every other year, and providing a moderate utilization limit would help minimize spring and winter competition. All four pastures are important antelope and sage grouse habitat. Long-term spring and winter competition for forage would be expected to be minimal.

Competition between livestock and antelope in the Lower Lake Allotment would be eliminated. Thus, antelope would be positively impacted.

The Lower Bare Allotment is the most important antelope winter range in the study area. Antelope use the area heavily in the winter but cannot use it in the spring because of the lack of forbs. This alternative would eliminate all livestock competition for forage and would use livestock grazing to improve the range for antelope. Antelope would be positively impacted.

All aspen communities in the Selic-Alaska Canyon Allotment would have reproduction survival, which would have a very great beneficial impact on beaver, deer, and raptors. Improvement in bitterbrush and mountain mahogany would have a positive impact on deer and other dependent wildlife species.

Three-Treatment Grazing System. Under the three-treatment grazing system during Treatment A, impacts would be the same as those described above for Treatment A in the four-pasture system.

During Treatment B and D, impacts would be the same as those described above for Treatments B and D in the four-pasture system.

After one grazing cycle, forage for deer and antelope would increase and population trends would be expected to increase. Sage grouse and quail populations would also be expected to increase. Nongame species would also be expected to increase. Degradation of aspen stands would be halted, reversing the trend of nesting habitat for red-tailed hawks, goshawks, and other raptors dependent on aspen.

The long-term impacts expected at the end of 15 years would be the same as those expected for the four-pasture system except that response of aspen would be much better in the three-treatment area. Nesting habitat for red-tailed hawks and goshawks would increase, making population increases possible.

Two-Pasture Winter Grazing System. Short-term impacts would be beneficial. Competition between livestock and deer, antelope, and sage grouse would be eliminated under both treatments.

The results of long-term management under this system would be beneficial. The degree of benefit would be small because of the very slow recovery rate expected of the vegetation.

One-Pasture Winter Grazing System. Impacts of the one-pasture winter grazing system would be anticipated as described above for the two-pasture winter grazing system.

CUSTODIAL MANAGEMENT AND GRAZING EXCLUSIONS

The impacts on wildlife of these forms of management would be as described under Alternative 4.

FACILITIES TO IMPLEMENT THE PROPOSAL

The proposed fences would have only a short-term impact on antelope and deer. Slight, positive long-term impacts would result from the removal of 39 miles of existing fence and relocation and construction of 41 miles of fence, designed to have a minimal impact on big game movement.

Water developments would be expected to have impacts similar to those described in Chapter 3. The reduction in livestock grazing pressure (AUMs), coupled with rest every other year and safeguards preventing livestock grazing pressure from exceeding moderate use, would be expected to provide an increase in cover and forage around water.

PRESCRIBED BURNING

In the short term, early spring burning would remove litter and rank growth and allow early sprouting of succulent grasses and forbs, which would provide more forage for deer and antelope at an earlier date because of the blackened earth.

Burning would remove food and cover for many other species. Above-ground nests and dens would be destroyed and some rodents might be burned. Nesting habitat for sage thrashers, Brewer's sparrows, and sage sparrows would be removed. Displaced animals would move to adjoining habitat. Intraspecific competition might occur and disrupt the animal populations and animals without territories might be taken by predators. The small size of each burn would minimize these impacts.

No significant impacts on threatened or endangered species would be expected.

Prescribed burning would be used as a tool to accelerate the movement of plant species composition toward site potential. As the habitat types evolve toward site potential, a greater natural diversity of plants and animals might be supported on each range site.

Over the long term, prescribed burning would favor perennial grasses and forbs over woody species. Replacement of continuous stands of dense sagebrush with grasses and forbs would improve deer spring and early summer range. Burning of bitterbrush and mountain mahogany stands would decrease the mainstay of the deer's summer, fall, and early winter diet. While decadent stands of brush might eventually be replaced by seedlings, it would be many years after a fire before bitterbrush and mountain mahogany stands contributed significantly toward satisfying deer forage requirements.

Prescribed burning would open up large dense stands of sagebrush and create habitat preferred by antelope. Antelope prefer open vegetative cover with a low aspect so that their keen eyesight and high speed running abilities can be used for escape. The burning would increase the amount of habitat usable by antelope and decrease their vulnerability to predation.

Other wildlife species would be favored by the amount of "edge" created by the small openings, even though many species are dependent on browse species for survival. The impact of vegetation diversity on various wildlife populations would be to provide a balanced diet.

Small openings created by prescribed burning would also be beneficial to most wildlife species such as rabbits, small rodents, and most small birds. Habitat which favors rabbit and rodent production also favors predatory birds and mammals such as coyotes, bobcats, hawks, and eagles.

Klebenow (1970) indicated that controlled burning could be a sage grouse management tool if planned carefully so as not to damage herbaceous vegetation. He stated that the increased forb production and the vegetation mosaic resulting from burning tends to favor sage grouse production.

No significant impacts on threatened or endangered species would be expected.

Aquatic Animals

TABLE 8-23 depicts the expected change in livestock use of fisheries resources under this alternative.

SYSTEMATIC GRAZING MANAGEMENT

The relationship of public and private stream ownership is shown in TABLE 8-24.

Home Camp-Duck Lake and Denio-Wall-Bare Allotments. The four-pasture grazing management system would impact 3.00 miles (18 percent) and 3.25 miles (20 percent) of public streamside in the Home Camp-Duck Lake and Denio-Wall-Bare Allotments, respectively. An additional 2.00 miles of public shoreline would be impacted in the latter.

Livestock would continue to concentrate in shore-stream zones (see Chapter 3, Treatments A and B). The degree of impact during the "use" and "seedripe" treatments would be lessened somewhat by: (1) A 60 and 72 percent reduction in livestock (AUMs) use in the Home Camp-Duck Lake and Denio-Wall-Bare Allotments, respectively; (2) A 20 percent reduction in the length of the grazing season; and (3) Discontinuance of grazing following the attainment of "moderate use" in the use pasture. Grazing every other year in the shore-streamside zones would continue to inhibit the stream's natural ability for self-repair. Only a slight improvement would be anticipated following 15 years of management.

Selic-Alaska Canyon Allotment. A moderate improvement in the condition of 2.00 miles (12 percent) of public streamside would be anticipated following two consecutive years of rest. The substantial reduction in livestock density would reduce the impact of a longer (50 percent) grazing season. Livestock would still concentrate in

TABLE 8-23
EXPECTED CHANGE IN DEGREE OF LIVESTOCK USE OF FISHERIES RESOURCES UNDER ALTERNATIVE 5

Allotment	Creek	Number of Miles Grazed	Type of System	Number of Treatments	% Reduction in Livestock	% Change in Degree of Use During Use Treatment
Tuledad	Bare	3.50	No Graze	0	100	(-) 100
	Silver	.75	No Graze	0	100	(-) 100
	North	.50	No Graze	0	100	(-) 100
	Emerson	1.00	No Graze	0	100	(-) 100
	Barber	2.50	No Graze	0	100	(-) 100
Subtotal		8.25				
Selic-Alaska Canyon	Alaska Canyon	1.00	Systematic Grazing	3	78	(+) 50
	Selic Canyon	1.00	Systematic Grazing	3	78	(+) 50
Subtotal		2.00				
Denio-Wall-Bare	Wall Canyon	3.25	Systematic Grazing	4	72	(-) 20
Home Camp-Duck Lake	Wall Canyon	3.00	Systematic Grazing	4	60	(-) 20

TABLE 8-24
PUBLIC AND PRIVATE STREAM OWNERSHIP

Stream	Miles on Public Land	Total Miles of Stream	Percent of Miles on Public Land
Barber Creek	2.5	3.0	83
North Creek	1.0	1.5	66
Bare Creek	4.0	8.0	50
Silver Creek	2.5	5.5	45
Emerson Creek	1.0	3.5	29

riparian-streamside zones (refer to Chapter 3, Treatment A for a description of impacts. A reversal of the downward trend in the aquatic habitat would be anticipated within 15 years.

Long-Term (15 Years) Impacts. Streamside vegetation and fisheries habitat conditions in the Home Camp-Duck Lake, Denio-Wall-Bare, and Selic-Alaska Canyon Allotments would be improved after 15 years. Streamside vegetation, shrubs, and herbs would increase, stream temperatures would decrease, and sedimentation would be reduced. Fish populations would show moderate increases.

CUSTODIAL MANAGEMENT

No fisheries resources exist in the custodial management areas.

GRAZING EXCLUSIONS

Tuledad Allotment. This alternative would have a beneficial impact on 8.25 miles (50 percent) of public streamside in the study area. Five perennial streams and one reservoir (0.65 miles of shoreline) would be affected as a result of the 100 percent reduction in livestock use. A considerable improvement in the physical condition of the aquatic environment would be anticipated within 15 years.

Facilities to Implement the Alternative and Prescribed Burning

There would be no impacts on fisheries resources from these management proposals.

WILD HORSES

Systematic Grazing Management

In the Denio-Wall-Bare Allotment, Treatments A and C would create some competition for forage and space with livestock. However, since the stocking rate would be reduced considerably and the pastures would receive only moderate use, the impacts on wild horses would be minimal. There would be some human activity required to work and herd the livestock but the horses would merely avoid the disturbance and return to their normal habits when the activity stopped.

The overall range conditions should improve very noticeably within 15 years with more perennial grasses and forbs available for wild horse forage consumption.

Custodial Management

Wild horse areas would not be affected by custodial management. Impacts would be as described in Chapter 3.

Grazing Exclusions

Since no grazing is proposed for the Tuledad Allotment, the impacts on the area would be the same as discussed in Alternative 2.

Facilities to Implement the Alternative

Impacts of water facilities on wild horses would be the same as discussed in Chapter 3, for the Bare Allotment.

Prescribed Burning

Fire would be used on some of the range sites utilized by horses. The areas to be burned would be relatively small (less than 40 acres at a time) so that the burning should not cause any impacts on the horses. The horses would move out of the area during the actual burning and would return when the activity stopped.

VISUAL RESOURCES

Systematic Grazing Management

For this alternative, proposed management practices and project developments would cause varying impacts on the visual resources depending on contrasts.

It would be anticipated that improvement of the resources related to reduced stocking rates and additional areas excluded from grazing and facility project development could improve the visual landscape, however, not to a point where VRM classes would change.

Types of impacts would be the same as stated in Chapter 3 for the allotments to be grazed under the various systems. However, as stocking rates would be lower than the current rate, the extent of contrast in the vegetation features might not be great.

The Selic-Alaska Canyon Allotment is the only area in Class II lands that would be grazed.

Custodial Management

Impacts would be the same as stated in Chapter 3 for the allotments under custodial grazing.

Grazing Exclusions

Types of impacts in the Bicondoa Allotment would be the same as stated in Chapter 3. Impacts in the Tuledad Allotment would be the same as analyzed in Alternative 2 (No Action). Stocking rates in adjacent grazed pastures would be lower than the current rate and the extent of contrast in the vegetation features between grazed pastures and allotments to be excluded might not be great.

A portion of Class II lands in the Tuledad Allotment would be excluded from grazing.

Facilities to Implement the Alternative

Types of impacts related to water developments and fence construction/removal would be the same as stated in Chapter 3. None of the new fence construction would be in Class II lands. Removal of a total of 25 miles of existing fence would alleviate its impact to the visual resources.

Prescribed Burning

Prescribed burning of 26,818 acres would cause impacts on the visual resources. However, as specific burning locations have not been determined, only general types of impacts can be addressed.

Distant views might be temporarily blocked if visibility were reduced by smoke from fires.

Prescribed fires can rarely be applied uniformily to an area; the resultant variety could add to visual resource values.

Some of the burning would probably be in Class II lands and within view from Highways 81 and 34.

CULTURAL RESOURCES

Systematic Grazing Management

Implementation of systematic grazing systems proposed under this alternative would result in a continuation of impacts from trampling on cultural resources throughout the livestock grazing areas. While reductions in stocking rates would reduce the intensity of trampling, and while combining existing allotments as pastures would redistribute the sequence in which impacts were realized, this would not alter the fact that a predicted 6,300 open archaeological sites would lie within a zone open to potential impacts from diffuse trampling. These sites are arrayed in the following allotment distributions:

Home Camp-Duck Lake—2,679
Denio-Wall-Bare—2,709
Selic-Alaska Canyon—60
Lower Bare—690
Lower Lake—162

Further, 86 known archaeological sites, including six *National Register* eligible properties, occur at locations where livestock congregate and would continue to receive more intense trampling than the majority of sites (see TABLE 8-5 for site types and allotment distributions).

Light winter grazing in the Lower Bare and the Lower Lake Allotments would have the least potential impact from trampling, and in many instances the passage of cattle would be so diffuse as to have an unmeasurable effect. Of the total number of sites, a predicted 852 lie within this zone of minimal impacts.

Custodial Management

Impacts would be the same as described in Chapter 3.

Grazing Exclusions

Termination of grazing in the Tuledad and Bicondoa Allotments would have no adverse impacts on cultural resources and, by removing the agents of trampling, would constitute a significant improvement over the present situation. A large number of the 1,349 open archaeological sites predicted to lie in these allotments would stand to benefit, especially those located where livestock presently congregate.

Facilities to Implement the Alternative

The qualitative impacts of water developments (springs and reservoirs) would be as described in Chapter 3. Of those proposed under this alternative, the construction of three springs and one reservoir could adversely impact four archaeological sites (see TABLE 2-40 for site types and allotment distributions).

The construction of 33 miles of fence (and the removal of 25.5 miles of existing fenceline) could partially disturb the contexts of an unpredictable number of sites in the manner described in Chapter 3.

Prescribed Burning

The impacts of fire on cultural resources have not been studied, thus they defy quantitative expression. Readily identifiable categories of impact, however, include the total obliteration of historic wooden structures, thermal fracture of prehistoric surface lithic materials, and the destruction or alteration of certain surface or near-surface physicochemical features including, but not limited to, detectable radiocarbon ratios of organics, obsidian hydration layers, and surface soil chemistry. Further, paleoecological features (such as pollen components and faunal remains) at or near the surface could be destroyed. Subsurface materials would be adequately protected.

It should be underscored that, prior to the establishment of the current fire-control regime, most if not all of the sites in the study area were subject to repeated natural burning and have therefore already received a measure of the im-

TABLE 8-25
KNOWN CULTURAL RESOURCES WHICH WOULD BE IMPACTED BY LIVESTOCK GRAZING AND WATER DEVELOPMENTS UNDER ALTERNATIVE 5

Impacts by Allotment	Villages	Base Camps	Temporary Camps	Lithic Scatter	Quaries	Rock Shelter	NRHP 1/
Home Camp-Duck Lake							
Trampling 2/	1 3/	7	9	10	2		2
Water Development 4/			(#90,179) 2				
Denio-Wall-Bare							
Trampling			16	13	10	1	3
Lower Bare							
Trampling			2	2			
Water Development 4/			(#61) 1	(#73) 1			
Lower Lake		8/4 5/		5			(District) 1

1/ Sites or districts eligible for nomination to the National Register of Historic Places.

2/ Sites which would be impacted by intense trampling during the first grazing cycle.

3/ On private lands.

4/ Sites which would be directly impacted by spring/reservoir projects. Project numbers are shown in parentheses.

5/ Eight sites on public lands and four on private lands.

pacts described above. Implementation of this alternative would thus impose no new impacts, but would promote an intensification of those already experienced.

Because actual on-the-ground locations of burning tracts have not been established, it is not presently possible to identify the sites which might be impacted nor, even, to predict the number of sites which would fall within the potential impact zone. Applying the area-wide density coefficient of 8.19 sites per square mile, it might be roughly projected that about 343 sites would lie within the proposed burning tracts and could suffer some deterioration of their information contents.

RECREATION RESOURCES

Systematic Grazing Management

Implementation of this alternative would have an impact on recreation resources and use opportunities.

Recreation use by 1991, with this alternative, would be estimated to be the same as shown in Chapter 3: 53,779 activity occasions.

It would be anticipated that proposed improvements in resources would not cause a sudden influx of new recreation occasions, however the quality of the recreation experience for the users should be improved due to lower stocking rates and exclusion of additional areas from grazing or facility development.

Generally impacts would be the same as stated in Chapter 3 for the allotments to be grazed. However, as stocking rates would be lower than the current rate, there could be a corresponding decrease in the extent of livestock concentrations that cause negative impacts on recreation users. Wildlife habitat, watershed, and water quality could show improvement, thus increasing the quality of the recreation experience.

In those allotments (Lower Bare and Lower Lake) where grazing would be in the winter only, there would not be direct conflict with recreation users the remainder of the year. Conflicts related to hunters would exist for those hunting seasons that fall between November 1 and February 1.

Custodial Management

Impacts would be the same as stated in Chapter 3 for the allotments under custodial grazing.

Grazing Exclusions

Impacts would be the same as stated in Chapter 3 for areas to be excluded from grazing (Tuledad and Bicondoa Allotments).

Facilities to Implement the Alternative

Removal of 25 miles of existing fence would result in additional recreation use as movement would not be restricted in those areas.

Prescribed Burning

Prescribed spot burning of 26,818 acres would cause impacts on recreation resources. However, as specific burning locations have not been determined, only general types of impacts can be addressed.

Prescribed burning could reduce the chances of wildfire, thus improving safety conditions for recreation users. During the actual burning, a safety hazard could exist.

Burning could interfere with recreational opportunities depending on the location, time of year, and duration of the burn.

Prescribed burning would provide a temporary disruption to sightseeing (smoke and blackened vegetation) and activities such as hunting that are dependent on wildlife habitat numbers.

WILDERNESS RESOURCES

Systematic Grazing Management

Impacts on wilderness resources can only be addressed in general terms as specific locations for wilderness study areas from which wilderness area designations may result have not as yet been identified.

With this alternative the resources upon which wilderness values are based could be improved due to reduced stocking rates, additional grazing exclusions and areas free from facility development.

Types of impacts would be the same as stated in Chapter 3 for those allotments to be grazed. However, as stocking rates would be lower than the current rate, there could be a corresponding improvement in resources related to wilderness values.

Custodial Management

The custodial grazing allotments would probably not conflict with areas having potential to be designated wilderness study areas.

Grazing Exclusions

For grazing exclusion areas, types of impacts would be the same as stated in Chapter 3.

Facilities to Implement the Alternative

Types of impacts would be the same as stated in Chapter 3 related to water developments and fence construction.

A portion of the 25 miles of existing fence that would be removed might fall within potential wilderness study areas, thus increasing the potential for designation.

Prescribed Burning

Prescribed burning of 26,817 acres could cause adverse impacts on wilderness resources. However, as specific burning locations have not been determined, nor have specific wilderness study areas been identified, only general types of impacts can be addressed.

Natural fires have burned for many centuries, thus fire is a characteristic of the natural landscape. Prescribed burning would have a lesser impact on wilderness values than fire suppression since fire is a natural component of the landscape. Heavy smoke and blackened vegetation could present an unnatural appearance to some wilderness users.

LAND USE

Livestock Grazing

SYSTEMATIC GRAZING MANAGEMENT

The primary impact of this alternative on livestock grazing would be the decrease in the amount of livestock use allowed (TABLE 8-26). Herd size and red-meat production would decrease correspondingly. Impacts on calf and lamb weights, death loss, cull weights, and percent calf crop would be similar to those described in Chapter 3 (TABLE 3-19).

The later turnout date of May 15 would require livestock to be fed hay or other forage during the spring months when customarily they were on public land. Total hay requirements, however, might not exceed existing levels since herd sizes would be reduced from present levels.

Crossbreeding and the alteration of established blood lines would be disrupted since different livestock herds would be run together.

The time and manpower spent gathering and sorting livestock at the end of the grazing season would be increased.

Grazing Exclusions and Facilities to Implement the Alternative

Increased costs and manpower would be required if ranchers were to wish to graze intermingled private lands in allotments where grazing would be excluded.

The maintenance of allotment and pasture fences would be similar to the existing requirements because of the combination of allotments and creation of larger pastures.

PRESCRIBED BURNING

Increased grass and forb composition and reduced sagebrush and juniper from burning would benefit livestock by providing more palatable species. Livestock weight gains would improve slightly on areas burned.

Agriculture

The impacts of the proposed action on agriculture would be the same as those described for Alternative 1.

SOCIO-ECONOMIC CONDITIONS

Economic Conditions

POPULATION

Populations within the study area should remain at relatively the same level that currently exists should this alternative be implemented, since the majority of ranch families which now operate allotments within the Systematic Grazing Management Area would still be licensed to run livestock.

EMPLOYMENT

Implementation of this alternative could result in four of the allotments requiring the services of at least two additional ranch hands (the Home Camp-Duck Lake, Denio-Wall-Bare, Selic-Alaska Canyon, and Lower Bare Allotments). This labor would be necessary since, by combining these allotments, herding and movement to specific pastures would be required more than at the present time. It would be unlikely that the Lower Lake Allotment would require additional cowboys. Overall, since grazing in the Tuledad and Bicondoa Allotments would be terminated, it would be estimated that the maximum additional ranch labor required under this alternative would be less than 30 manmonths. This is based on the assumptions that two seasonal employees would be required in the four allotments, and that part of this additional labor requirement would be filled by ranch labor from the Tuledad and Bicondoa Allotments. Any increase in labor within the agricultural sector as a result of this alternative would be rather insignificant, considering that in Modoc County over 1,000 individuals are now employed by agriculture.

TABLE 8-26
LIVESTOCK USE UNDER ALTERNATIVE 5

Allotment	Present Use (AUMs)	Use After 15 Years (AUMs)	Net Change (AUMs)
Selic-Alaska Canyon	1,239	1,141	- 98
Lower Bare	2,087	521	- 1,566
Home Camp-Duck Lake	13,372	5,671	- 7,701
Tuledad	10,947	0	-10,947
Bicondoa	368	0	- 368
Bare-Wall-Denio	17,148	6,615	-10,533
Lower Lake	698	163	- 535
TOTALS	45,859	14,111	-31,748

Some additional employment in the construction sector would also be anticipated, because several new water developments would be installed and several miles of fence would be removed or constructed (TABLE 8-27). The proposed prescribed burning of over 26,000 acres of public lands would consume other manmonths. During the two-year implementation schedule for range facilities and prescribed burning, an estimated 74 manmonths of labor would be consumed.

Monitoring and supervision by the BLM would consume an additional six manmonths of labor per year above existing levels.

INCOME

Regional Livestock-Related Income. Initially, implementation of this alternative would result in reduction of livestock AUMs from a current (1976) authorized level of 45,859 to 14,111 by the fifteenth year (a decrease of 69 percent).

This decrease would reduce sales resulting from activities in the livestock sector by an estimated $251,444 (31,748 AUM decrease × $7.92 per AUM). Given a livestock multiplier factor of 1.74, this decrease in livestock AUMs could result in the regional economy having less activity than would normally be anticipated (estimated decrease of $437,512). Included in this figure is a decrease in household incomes of $93,034 ($251,444 × household coefficient of .37).

Allotment Livestock-Related Income. Implementation of this alternative would have an impact on all ranch operations within the Systematic Grazing Management Area. TABLE 8-28 indicates discounted cost/revenue levels that could be anticipated at either a 6⅛ or 12 percent interest rate.

As TABLE 8-28 indicates, the operators' discounted costs for operating under the alternative for 50 years at a 6⅛ percent interest rate would be $990,160. This figure includes maintenance costs for existing and proposed facilities, plus grazing fee payments. Costs associated with cancelling the grazing privileges on the Bicondoa and Tuledad Allotments are not included, however. These costs (or decreases in value) to the ranch operations would be: $21,000 to Bicondoa; $635,000 to Tuledad (see Alternative 4 for calculation routine). Therefore, the total costs which the ranching sector would have to contend with for operating under this alternative over a 50-year period would be $1,646,160.

The operators' discounted revenues from operating under this alternative for 50 years at the 6⅛ percent interest rate would be $2,127,228. As in the other alternatives, this is the sum of the discounted gross revenues which would go to the permittees from consuming forage as proposed.

The difference between those discounted costs and revenues shown in TABLE 8-28 is positive ($1,137,068). Use of a higher interest rate for discounting purposes (12 percent) decreases the apparent difference between discounted costs and revenues to $482,398, not including costs incurred by the Bicondoa or Tuledad Allotments. These totals would appear to indicate that even though significant cuts in AUMs would be expected with this alternative, the livestock industry within the study area in general would not be completely eliminated.

Termination of grazing privileges in the Tuledad and Bicondoa Allotments would possibly make the ranch operations associated with these allotments less than operable. The same would hold true for Selic-Alaska Canyon, i.e., grazing would be allowed on the allotment only once every third year, which would cause discounted costs to exceed revenues at both the 6⅛ and 12 percent interest rate (see TABLE 8-28).

The present value of the changes in livestock production relative to existing conditions over a 50-year period at the 6⅛ percent interest rate would be −$1,618,599; sheep operators' grazing privileges would, in reality, be terminated under this alternative.

Contract Construction-Related Income. Implementation would require the expenditure of $362,625 for range facilities, of which area permittees would incur costs of approximately $18,000. As most of this construction would be accomplished by out-of-area laborers, however, it would be estimated that only 10 percent of total expenditures might actually stay within the region. An additional $6,928 in wages paid to construction labor could be added to the local/regional economy during the two-year construction period. In turn, this increase in wages would add an estimated $7,746 to household incomes within the region. The difference in these figures is the amount that would accrue to permanent residents in the region (an estimated $818), since the initial expenditure of $6,928 would all be to nonresident construction labor.

TABLE 8-27

ESTIMATED COSTS OF FACILITIES BY YEAR OF EXPECTED COMPLETION PLUS MAINTENANCE

Type of Development	Total Units	Per Unit Cost in ($)	Year 1 No.	Year 1 Cost ($)	Year 2 No.	Year 2 Cost ($)	Total Annual BLM Maintenance Costs	Total Annual Rancher Maintenance Costs
Water								
Springs	22	1,764	22	38,800				
Reservoirs	18	4,522	18	81,400				
Wells	6	4,000	6	24,000				
Pipelines	14 miles	2,000	14	28,000				
Fences								
Divisional 1/	80 miles	1,513			80	121,000		
Exclosure	8.6 miles	2,000			8.6	17,200		
Other								
Cattleguards	6	2,000			6	12,000		
Prescribed Burning	26,817	1.50			26,817	40,225		
TOTALS				$172,200		$190,425	$12,305 2/	$10,785 2/
Income Effects on Local Households 3/				17,220		19,043	3,692 4/	3,236 4/

1/ Includes 41 miles of new fence and the removal of 39 miles of existing fence.

2/ Figures derived from Benefit/Cost Analysis prepared for this particular alternative. These maintenance charges solely reflect maintenance of the proposed facilities listed above. They do not consider maintenance responsibilities for other existing facilities, shown in Alternative 1.

3/ This is an estimate of that proportion of monies spent in construction (personal consumption expenditures) that would actually stay within the region. If it is assumed that 20 percent of the total costs would be for wages, it must also be assumed that only about 50 percent of the 20 percent figure would actually remain in the region for motel rooms, meals, gas, etc. This assumption is made since out-of-area workers would be the principal contract recipients.

4/ Assuming that 30 percent of maintenance costs would be for wages and that local labor would be employed.

Annual Maintenance-Related Income. Maintenance costs for facilities that would be added to public lands under this alternative would annually require the expenditure of $23,090. The effect these maintenance charges would have on gross local incomes is depicted on the bottom line of TABLE 8-27. Using the household coefficient developed for the region, annual maintenance would add an estimated $7,759 to personal incomes ($6,928 ⅛ household coefficient of 1.12).

Recreation-Related Income. If this alternative were to be implemented, activity occasions would increase by an estimated 59 percent over existing levels during the next 15 years (see Recreation).

Recreational use is estimated in activity occasions. An estimate of economic benefits which might accrue to local residents from such uses of the public lands has not been calculated. Even though specific quantification is impossible, the projected increase in activity occasions with this alternative would be minor in comparison to current regional activity occasion levels, which exceed 60 million.

Other Income Effects. Implementation of this alternative would require further employment of Federal personnel to oversee and assess the impacts of grazing under conditions set forth in this alternative. This increased employment would be expected to consume an estimated six manmonths of labor which, if converted to dollars, would increase gross wages paid to individuals within the region by an estimated $6,000.

SOCIAL SUPPORT FACILITIES AND SERVICES

Impacts on social support facilities and services would be as described in Chapter 3.

PUBLIC FINANCE AND TAX BASE

With full implementation, livestock numbers could decrease by an estimated 4,693 sheep and 4,235 cattle. Given the State's tax rate on livestock, implementation would therefore decrease tax revenues by an estimated $13,595 annually after the fifteenth year.

In addition, property values would decrease by an estimated maximum of $2,474,000 by the fifteenth year (no inflation assumed). This figure reflects termination of two present allotments and a decrease in livestock forage AUMs on the remaining allotments of 31,748 by the fifteenth year, continued production at that level through the fiftieth year, and discounting back using a 12-percent interest rate.

Assuming that methods of calculating taxes were to remain constant for the next 15 years (25 percent of market value × $8 per $100 of assessed value), property taxes would decrease by about $49,478 annually as a result of implementing Alternative 5.

Social Characteristics

Alternative 5 might be positively received by individuals most interested in wildlife conservation or in various forms of recreational use which can occur in this area. Competition for forage between wildlife and livestock would decline because livestock grazing would be reduced in the study area by nearly 70 percent. In addition, key winter ranges and other critical habitat would be closely monitored to assure that overuse of any particular area would not occur. Most game and nongame species common to the area should be positively impacted through implementation.

People most concerned with the natural aesthetics of the area or to whom fences connote injury problems to wildlife and wild horses might dislike this alternative. Overall, however, it is thought that most user groups not economically tied to the public lands within the study area would accept and support Alternative 5.

Reactions to the proposed prescribed burning, however, might be mixed. Many individuals might feel that the long-term benefits of wildfires in specific areas to aid vegetal response would outweigh the shorter-term problems of visible air pollution, closures to ORV use or to hunting, or the impairment of other aesthetic values. Some people might never accept the use of fire as a land-management tool. For those most interested in the preservation of artifacts, burning might connote a longer-term impact since it would be very possible that surface archaeological resources would be destroyed.

From a rancher's perspective, it would seem likely that Alternative 5 would receive little support. Forage made available for livestock from public lands would be reduced by nearly 70 percent; in the Bicondoa and Tuledad Allotments, grazing would be completely terminated. The social ramifications of these actions are incalculable. However, it would be likely that this alternative would result in much criticism from involved area permittees; ranchers would lose not only certain management prerogatives over their operations, but these losses in self-determinism would not be offset by financial gains.

TABLE 8-28 DISCOUNTED RANCHER COSTS/REVENUES UNDER ALTERNATIVE 5 WITH A 6-1/8 AND 12 PERCENT INTEREST RATE

Discounted Rancher Costs in Present Terms--6-1/8 Percent Interest Rate					Discounted Rancher Revenues				
Allotment	Improvement-Maintenance	Change In Grazing Fees 1/	Existing Level of Grazing Fees 1/	Total Discounted Rancher Costs By Allotment	Changed Quantity of Livestock Forage	Livestock Production (Increased Nos., Higher Weights) 2/	Cull Cows	Existing Level of Livestock Forage	Total Discounted Rancher Revenues By Allotment
Selic-Alaska Cy.	$ 68,621	$- 30,083	$ 38,387	$ 76,925	$- 105,292	$- 1,261	$ -	$ 134,353	$ 27,800
Bare-Wall Canyon-Denio	356,230	-346,298	531,276	541,208	-1,212,043	392,838	10,831	1,859,467	1,051,093
Home Camp-Duck Lake	167,792	-254,750	414,289	327,331	- 891,625	261,687	132,643	1,450,011	952,716
Lower Bare	14,094	- 48,517	64,659	30,236	- 169,811	-	4,360	226,307	60,856
Lower Lake	9,410	- 16,575	21,625	14,460	- 58,013	11,866	5,221	75,689	34,746
	$616,147	$-696,223	$1,070,236	$990,160	$-2,436,784	$ 665,130	$153,055	$3,745,827	$2,127,228

Discounted Rancher Costs Computed at a 12-Percent Interest Rate

Allotment	Improvement-Maintenance	Change In Grazing Fees 1/	Existing Level of Grazing Fees 1/	Total Discounted Rancher Costs By Allotment	Changed Quantity of Livestock Forage	Livestock Production (Increased Nos., Higher Weights) 2/	Cull Cows	Existing Level of Livestock Forage	Total Discounted Rancher Revenues By Allotment
Selic-Alaska Cy.	$ 36,789	$- 16,127	$ 20,579	$ 41,241	$- 56,496	$- 515	$ -	$ 72,025	$ 15,064
Bare-Wall Canyon-Denio	192,652	-190,707	284,811	286,756	-667,475	160,568	4,427	996,839	494,359
Home Camp-Duck Lake	93,852	-137,350	222,096	178,598	-480,725	106,961	54,216	777,334	457,786
Lower Bare	9,783	- 26,010	34,663	18,436	- 91,034	-	1,782	121,321	32,069
Lower Lake	5,602	- 8,309	11,593	8,309	- 31,100	4,850	2,134	40,576	16,460
	$338,678	$-379,080	$573,742	$533,340	$-1,326,780	$ 271,864	$ 62,559	$2,008,095	$1,015,738

1/ Assuming a chare of $2 per AUM per year.

2/ Net change from existing level of revenue for this alternative at a 6-1/8 percent interest rate are: $-709,903; at a 12-percent interest rate, the net change is $-290,164.

Source: Benefit/Cost Analysis, BLM Susanville District, 1977.

Moreover, the issue of burning might create further problems. Some area permittees having experienced the effects of fire on vegetation on their own ranches, might accept prescribed burning more readily than individuals in other interest groups. However, as private lands, and private range facilities are intermingled with the public lands and facilities, there would undoubtedly be concern expressed as to whether the burns could be controlled. These peoples' lifestyles are tied directly to the lands considered in this study. Unlike the casual visitor who can adjourn to other areas for recreation and/or aesthetic pleasures, area permittees would have to live with the burned areas until the following year. As most area ranch families seem to derive a tremendous amount of pleasure from the aesthetic values offered by the open vistas within the study area, it would be unlikely that everyone would agree with the concept of prescribed burning. Yet negative attitudes might be displaced or reduced by the idea of longer-term benefits of such actions, i.e., greater vegetal response.

Mitigation Measures

Burning of bitterbrush or mountain mahogany stands would have an adverse impact on deer. Replacement of these stands may be impossible. Steps will be taken to ensure that these stands will not be burned either purposely or accidentally.

During prescribed burning, straight edges and regular shapes will be avoided by following contours and blending burn areas into natural vegetative features. Where scenic and sightseeing values are high, prescribed fire will be used at the beginning of the rainy season or just before the growth period begins to minimize the length of time ground will remain blackened.

Each of the mitigative measures enumerated in Chapter 4 for cultural resources is appropriate under this alternative. Specifically, Measure 2 will be implemented for the six *National Register* eligible properties which would suffer intense livestock trampling, Measures 26 and 27 will be applied to the water developments which could impact four archaeological sites, Measure 23 will be applied to all fence construction, and Measures 3 and 4 to all proposed facilities not presently accessible by road.

Existing fencelines proposed for removal will be surveyed for cultural resources. Where sites have already been transected and would be further impacted by mechanized operations, removal by hand will be performed to minimize disturbance.

Where burning is proposed for areas not yet surveyed for cultural resources, survey will be performed to assess specific impacts. *National Register* eligible properties and historic wooden structures will be excluded from burning. Other sites will be excluded wherever it is logistically feasible; where it is not, comment on the impacts of the action will be elicited from the appropriate State Historic Preservation Officers and from the Advisory Council on Historic Preservation. Resulting recommendations may include archaeological salvage operations or the abandonment of a portion of the burning program.

No other mitigating measures have been identified.

Unavoidable Adverse Impacts

During the burning process, small bird and mammal nests and dens would be destroyed and some animals might be burned. Food and cover would be destroyed and animals would be displaced to other areas. Populations of small animals might be disrupted and predation might increase.

The adverse impacts listed in Chapter 5 that relate to visual and wilderness resources would also apply to this alternative where the grazing system and facility development impacts are similar to those presented in Chapter 3.

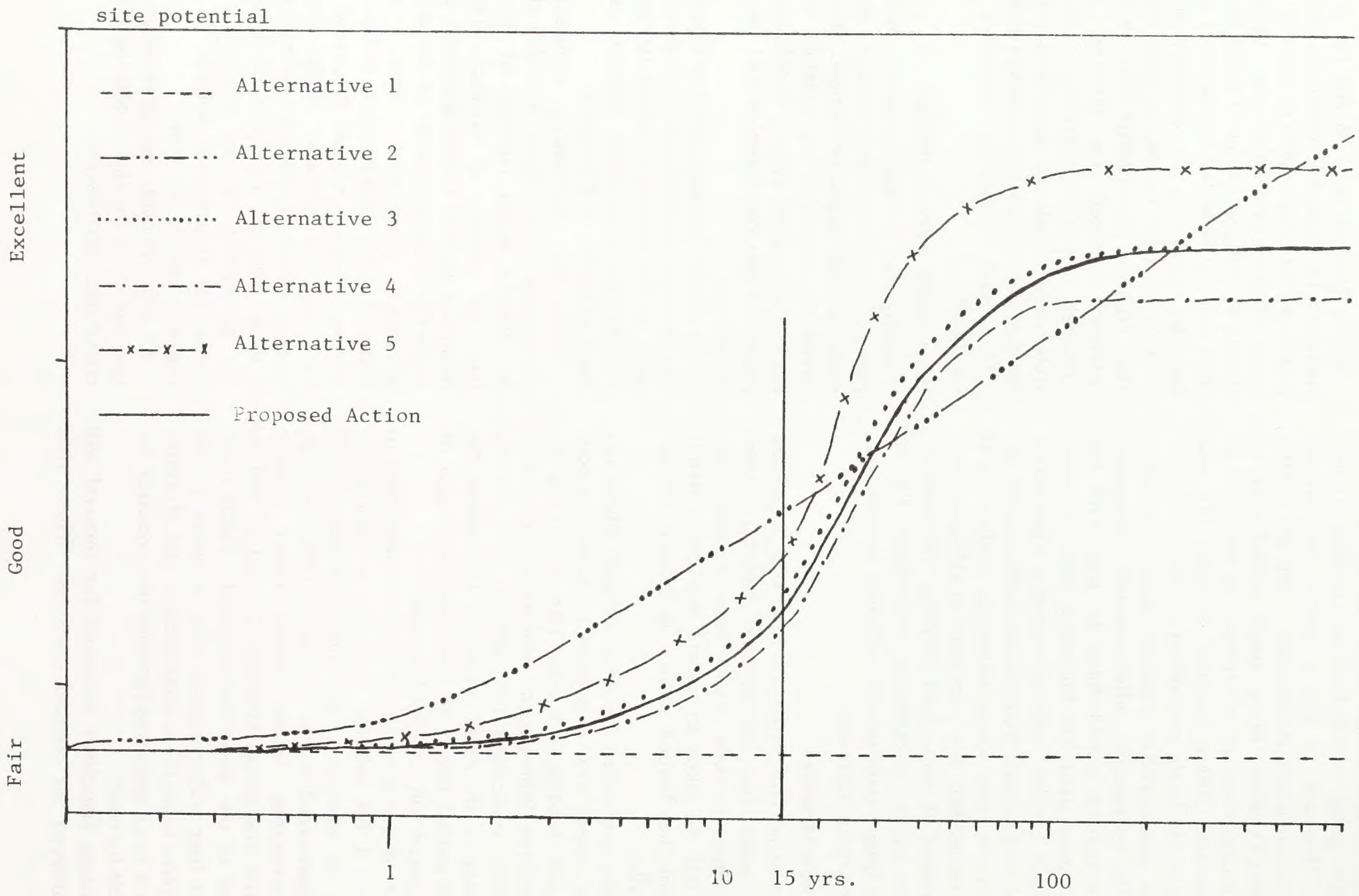
Under this alternative, archaeological sites throughout all allotments in which grazing would be allowed would continue to receive impacts from the passage of livestock. The effects of trampling and of livestock-related erosion could extend to a large number of the predicted 6,300 potentially impacted sites, and would unquestionably affect many so-far undiscovered *National Register* eligible properties as well. All such impacts, however slight, would be permanent and all lost information irretrievable.

Even with the proposed mitigating measures, the prescribed burning program could further erode the information content of the cultural resource base of the area.

All other impacts described under this alternative cannot be mitigated and therefore would be considered unavoidable.

FIGURE 8-7

Hypothetical Relationship Between Improvement in Range Condition and Time After Implementation of the Proposed Action and Alternatives 1/



1/ The relationships are general, representing average conditions for the livestock grazing areas (except for Alternative 2). Actual responses would be highly variable between grazing allotments and habitat types.

TABLE 8-29

COMPARISON OF IMPACTS FOR MAJOR RESOURCE COMPONENTS

Area of Impact	Unit of Measure	Existing Environment	Proposal as Mitigated	Alternative 1 Continue Present Management (No Action)	Alternative 2 No Livestock Grazing	Alternative 3 Proposed Action with Livestock Reductions	Alternative 4 Variety of Grazing Systems	Alternative 5 Combination of Existing Allotments
VEGETATION	Range Condition	Most habitat types are in fair condition with a static or upward trend. Habitat types which serve as livestock concentration areas are in poorer condition with downward trends.	Moderate improvement in vigor and reproductive success of perennial grasses and forbs. Most habitat types would improve from fair to good condition. The response of aspen and bitterbrush would be variable depending on soil moisture conditions and degree of utilization.	Most of the area would remain unchanged. Aspen would continue to deteriorate. The willow/Nevada bluegrass communities would possibly be eliminated. The Nevada bluegrass-sedge habitat type would be reduced to poor condition.	Substantial improvement in range condition resulting primarily from increased plant vigor. The major response would be on moist habitat types.	Impacts would be similar to the proposal except that the degree of impacts and rates of response would change. Less accessable areas would demonstrate improved responses.	Substantial improvement in range condition on systematic grazing areas and grazing exclusions areas. Slight improvement in range condition on defered grazing areas.	Substantial improvement in range condition on 3 and 4 pasture grazing systems. Very slow improvement in range condition on 1 and 2 pasture winter grazing systems. Substantial improvement on grazing exclusion areas

TABLE 8-29

COMPARISON OF IMPACTS FOR MAJOR RESOURCE COMPONENTS

Area of Impact	Unit of Measure	Existing Environment	Proposal as Mitigated	Alternative 1 Continue Present Management (No Action)	Alternative 2 No Livestock Grazing	Alternative 3 Proposed Action with Livestock Reductions	Alternative 4 Variety of Grazing Systems	Alternative 5 Combination of Existing Allotments
SOIL Soil Erosion	Tons/Ac/Yr.	824,459	65% of acres would have inadequate cover to prevent accelerated soil erosion. 35% of area would not have adequate cover to prevent acclerated soil erosion, but would have moderately improved.	32% of acres would have adequate cover to prevent accelerated soil erosion. 68% if area would not have adequate cover to prevent accelerated soil erosion, some soil would decrease in condition.	All areas would have adequate cover to prevent accelerated soil erosion after 15 years except HT. 13, 26 and 27 which would have large improvement but would need more time to reach maximum vegetative cover.	Decreases in soil erosion would be the same as proposed action on grazed areas and total response overall, would be somewhat better than proposed action.	25% of area same as proposed action 33% of area same as Alt. #1 1% unknown 41% same as Alt. #3.	Area would respond as described in proposed and mitigation with quicker response due to reduced livestock numbers.

TABLE 8-29

COMPARISON OF IMPACTS FOR MAJOR RESOURCE COMPONENTS

Area of Impact	Unit of Measure	Existing Environment	Proposal as Mitigated	Alternative 1 Continue Present Management (No Action)	Alternative 2 No Livestock Grazing	Alternative 3 Proposed Action with Livestock Reductions	Alternative 4 Variety of Grazing Systems	Alternative 5 Combination of Existing Allotments
WATER RESOURCES								
Storm Runoff	% Change	0	Initiation of management systems could reduce runoff up to 50%. The exclusion of grazing from certain areas will have a signigicant but unquantifiable local effect.	0	Total effect would be less than the 50% anticipated under proposed action.	Would experience same as under proposed action (-50%) on grazed areas and ungrazed areas would respond similar to Alt. #2 and proposed action.	Impacts would be the same as Alt. #2 in the grazing exclusion areas. Deferred grazing will result in moderate improvement on those allotment. The allotments under rest-rotation grazing management systems will experience the same improvement as the proposed action (-50%) and Alt. #3.	Impacts would largely be the same as those described for the proposed action and Alt. #2 in the 3 and 4 pasture rest-rotation management systems. No significant changes are expected to occur within 15 years under the 1 and 2 pastures winter grazing management systems. Ungrazed areas would respond similar to proposed actions and Alt. #2.
Water Quality	% Change	0	Would improve however, it is not known how much	0	Would improve however, it is not known how much	Would improve however, it is not known how much	Would improve however, it is not known how much	Would improve however, it is not known how much

TABLE 8-29

COMPARISON OF IMPACTS FOR MAJOR RESOURCE COMPONENTS

Area of Impact	Unit of Measure	Existing Environment	Proposal as Mitigated	Alternative 1 Continue Present Management (No Action)	Alternative 2 No Livestock Grazing	Alternative 3 Proposed Action with Livestock Reductions	Alternative 4 Variety of Grazing Systems	Alternative 5 Combination of Existing Allotments
WILDLIFE								
Muledeer	Spring & summer habitat.	Poor w/downward trend.	Moderate improvement.	Moderate decrease in condition.	Large improvement.	Moderate improvement.	Moderate improvement.	Large improvement.
	Fall & winter habitat.	Poor w/downward trend.	Slight improvement.	Moderate decrease in condition.	Large improvement.	Slight improvement.	Moderate improvement.	Large improvement.
	Fawning areas.	Poor w/downward trend.	No net impact.	Large decrease in condition.	Large improvement.	No net impact.	Slight improvement.	Large improvement.
Antelope	Spring & summer habitat.	Fair w/static trend.	Moderate improvement.	Slight decrease in condition.	Large improvement.	Moderate improvement.	Moderate improvement.	Large improvement.
	Fall habitat.	Poor w/static trend.	Slight improvement.	Moderate decrease in condition.	Large improvement.	Slight improvement.	Moderate improvement.	Large improvement.
Sage-grouse	Nesting habitat.	Fair w/static trend	Moderate improvement.	Slight decrease in condition.	Large improvement.	Moderate improvement.	Moderate improvement.	Large improvement.
	Brood rearing habitat.	Poor w/downward trend.	Moderate improvement.	Moderate decrease in condition.	Large improvement.	Moderate improvement.	Slight improvement.	Large improvement.
	Wintering areas.	Fair w/static trend.	Slight improvement.	Slight decrease in condition.	Large improvement.	Slight improvement.	Moderate improvement.	Large improvement.
Quail	Yearlong habitat.	Poor w/downward trend.	Slight improvement.	Moderate improvement.	Large improvement.	Slight improvement.	No net impact.	Moderate improvement.
Waterfowl	Reproduction areas.	Poor w/downward trend.	Moderate improvement.	Moderate decrease.	Large increase.	Moderate increase.	Large increase.	Large increase.

TABLE 8-29

COMPARISON OF IMPACTS FOR MAJOR RESOURCE COMPONENTS

Area of Impact	Unit of Measure	Existing Environment	Proposal as Mitigated	Alternative 1 Continue Present Management (No Action)	Alternative 2 No Livestock Grazing	Alternative 3 Proposed Action with Livestock Reductions	Alternative 4 Variety of Grazing Systems	Alternative 5 Combination of Existing Allotments
Nongame	High animal density and variety areas.	Fair to poor w/downward trend.	Slight improvement.	Moderate decrease in condition.	Large improvement.	Slight increase.	Slight increase.	Large improvement.
Fisheries	Aquatic habitat.	Poor w/downward trend on 19 miles of riparian habitat.	Slight decrease in condition on 15 miles or riparian habitat and large increase in condition on 4 miles of riparian habitat.	Large decrease in condition on 19 miles of riparian habitat.	Large improvement in condition of 19 miles of riparian habitat.	Slight decrease in condition on 15 miles of riparian habitat and large improvement in condition on 4 miles of riparian habitat.	Large improvement in condition on 12 miles and slight decrease in condition on 2 miles and moderate decrease in condition on 5 miles of riparian.	Large improvement on 9 miles of riparian habitat. Moderate improvement on 10 miles of riparian habitat.

TABLE 8-29

COMPARISON OF IMPACTS FOR MAJOR RESOURCE COMPONENTS

Area of Impact	Unit of Measure	Existing Environment	Proposal as Mitigated	Alternative 1 Continue Present Management (No Action)	Alternative 2 No Livestock Grazing	Alternative 3 Proposed Action with Livestock Reductions	Alternative 4 Variety of Grazing Systems	Alternative 5 Combination of Existing Allotments
WILD HORSES	Overall Habitat Conditions with grazing.	Fair to good	Good	Fair to good	Good	Good	Improvement	Good
	Overall Habitat Conditions with Facility Development	Fair to good	Improvement	Fair to good	Good	Good	Improvement	Improvement
VISUAL RESOURCES	Visual quality with grazing.	Deteriorating	Improvement	Deteriorating	Improvement	Improvement	Improvement	Slight Improvement
	Visual quality with facility development	Deterioration	Slight deterioration	Deterioration	Slight deterioration	Slight deterioration	Slight deterioration	Slight Improvement

TABLE 8-29

COMPARISON OF IMPACTS FOR MAJOR RESOURCE COMPONENTS

Area of Impact	Unit of Measure	Existing Environment	Proposal as Mitigated	Alternative 1 Continue Present Management (No Action)	Alternative 2 No Livestock Grazing	Alternative 3 Proposed Action with Livestock Reductions	Alternative 4 Variety of Grazing Systems	Alternative 5 Combination of Existing Allotments
CULTURAL	Scope (No. of sites potentially impacted)	7,649	7,582	7,649	0	7,552	5,567	6,300
	Intensity of impacts (relative to present).	Continuous deterioration of cultural deposits.	Small reduction.	Same intensity.	0	Substantial reduction.	Substantial reduction.	Substantial reduction.
RECREATION	Number of activity occasions.	34,000	53,800	Slight increase over existing use, but decrease in quality.	60,000	53,800	Slight increase over existing use.	53,800 plus slight increase in quality.

TABLE 8-29

COMPARISON OF IMPACTS FOR MAJOR RESOURCE COMPONENTS

Area of Impact	Unit of Measure	Existing Environment	Proposal as Mitigated	Alternative 1 Continue Present Management (No Action)	Alternative 2 No Livestock Grazing	Alternative 3 Proposed Action with Livestock Reductions	Alternative 4 Variety of Grazing Systems	Alternative 5 Combination of Existing Allotments
WILDERNESS	Wilderness quality.	Deteriorating.	Slight improvement.	Deteriorating.	Slight improvement.	Slight improvement.	Slight improvement.	Slight improvement.
LIVESTOCK								
Active AUMs on Public Lands.	Active AUMs	46,225	53,655	35,052	0	17,722	20,619	14,111
ECONOMICS	Number of allotments in which grazing would be economically inoperable	0	1	0	0	1	0	0
	Number of allotments where grazing would be terminated	1	1	0	All 8	1	3	3
	Gross amount of livestock sales.	$366,000	$+59,000	$-86,000	$-366,000	$-174,000	$-200,00	$-251,000

Chapter 9

CONSULTATION AND COORDINATION WITH OTHERS

Chapter 9

CONSULTATION AND COORDINATION WITH OTHERS

The California and Nevada State Clearinghouses and State Historic Preservation Officers were notified prior to the development of the draft environmental statement. Consultations at a working level with the Department of the Interior and other Federal and State agencies were used to gain information.

Articles were placed in all local and regional newspapers. In addition, on September 27, 1976, letters were sent to the following requesting attendance at a public meeting for final review of the Tuledad/Home Camp land-use plans and to announce initiation of and to request input to the DES:

Susanville BLM District Advisory Board—10 members
California Stockmen's Organizations—6 organizations
Federal Agencies—8
California and Nevada State Agencies—29
City and County Governments—12
Conservation Groups—19
Congressmen and Senators—1
Surprise Valley Residents—42
Tuledad/Home Camp Planning Unit Grazing Permittees—21

Consultation and coordination efforts will continue with agencies, groups, and individuals during the development of the final environmental statement.

During preparation, the draft ES was discussed at several meetings:

May 11-13, 1976, Alturas, California—Attended by representatives of the BLM (California State Office and Susanville District Office) and 85 others from Federal, State, and County agencies and special-interest groups.

July 20, 1976, Alturas, California—Attended by representatives of the BLM (Washington Office, California State Office, and Susanville District) and other Federal, State, and County agencies and special-interest groups.

August 24-25, 1976—North Washoe Conservation Tour, attended by County committee members of the Agriculture Stabilization and Conservation Service, and representatives of the Conservation District, the Resource Conservation and Development Project, and the BLM (Susanville District Office).

September 29, 1976—Washoe County Agriculture Conservation Service Committee Meeting, attended by the BLM's Surprise Resource Area Manager and 12 committee members.

October 12, 1976, Alturas, California—Attended by BLM personnel from the California State Office —and Susanville District Office and by 44 representatives of Federal, State, and County agencies and special interest groups.

October 13, 1976—BLM's Susanville District Multiple-Use Advisory Board Meeting, attended by BLM personnel from Susanville District Office and by seven board members.

A 25-minute television interview on "Voice of Agriculture" was aired on 13 television and 23 radio stations.

Coordination in the Review of the Draft Environmental Statement

Many Federal, State, and local agencies have been contacted for assistance in the preparation of this document. The Draft Environmental Statement will be provided to them for their review and comments.

GLOSSARY

Glossary

ACTIVE USE: The actual amount of licensed or permitted livestock use.

ALLOTMENT: An area of land where one or more livestock operators graze their livestock. It generally consists of public lands but may include parcels of private or State owned lands. The number of livestock and season of use are stipulated.

An allotment may be divided into several pastures.

ADJUSTMENT IN (LIVESTOCK) NUMBERS: An increase or decrease in livestock numbers to conform to the amount of forage produced in the area in relation to other uses of the area.

ADJUSTMENT IN (LIVESTOCK) SEASON OF USE: Adjusting the time of livestock grazing on a range area based on type of vegetation or stage of vegetative growth.

ANIMAL UNIT MONTH (AUM): The amount of forage required to sustain the equivalent of one cow or five sheep for one month.

ASSOCIATION (VEGETATIVE): The basic unit of vegetation classification which embodies those characteristics of all actual climax stands among which differences in species composition are not attributable to inherent differences in environments. Applies only to climax plant communities.

AUTHORIZED LIVESTOCK USE: The maximum amount of livestock use which could be licensed or permitted.

BACK COUNTRY: An essentially roadless area in which the effects of man may be present but are not inconspicuous or unobtrusive.

BACKGROUND: The area of a visual zone which lies beyond the foreground-middleground, usually from a minimum of 3-5 miles to a maximum of about 15 miles.

Atmospheric conditions in some areas may limit the maximum to about 8 miles or extend it beyond 15 miles.

BIFACE: In archaeology, any chipped stone artifact with flakes removed from both surfaces. The production of some varieties of biface was often a stage in the manufacture of small artifacts.

OLSTERING: Seeking out people with similar beliefs and attitudes.

BOUND DEPENDENCY: Relationship between the young and their benefactors wherein the former must remain in a state of dependency for a prolonged period.

BUILD-UP FACTOR:

A factor used to calculate the present worth of future benefits.

CLIMATIC CLIMAX: Soil or microclimatic conditions pose no severe limitation to vegetation; characteristic of undulating topography and moderately drained loamy soils.

CLIMAX COMMUNITY: A biotic community which gain essentially permanent occupancy of a habitat and perpetuates itself there indefinitely unless disturbed by outside forces (from Daubenmire, *Plant Communities*, 1968, p. 25).

COLOR: The property of reflecting light of a particular wavelength that enables the eye to differentiate otherwise unidentifiable objects.

CONCHOIDAL FRACTURE: A pattern of breakage under pressure characteristic of glasses and cryptocrystalline rocks.

CONTRAST: The effect of a striking difference in the form, line, color, or texture of an area being viewed.

CONTRAST RATING: A method of determining the extent of visual impact of an existing or proposed activity which will modify any landscape feature.

CORE: Archaeologically, a block or stone (e.g., obsidian) from which flakes are removed for subsequent use or further working. Although a by-product of flake production, the exhausted core was itself sometimes utilized, as a scraper, "chopper," etc.

DEBITAGE: In archaeology, the detritus of stone-working activity.

DENIAL: A strategy to reduce inconsistencies between attitudes, values, and beliefs; disregarding of a value, belief, or attitude which creates conflicts.

DISPERSED RECREATION USE: Recreation use that occurs outside developed recreation sites.

EDAPHIC CLIMAX: Climax vegetation that differs from the climatic climax due to soil conditions.

ENHANCEMENT: A short-term management alternative accomplished to increase visual variety where little or no variety exists at present.

ETHNOGRAPHY: The anthropological description of living cultures.

FIRE DISCLIMAX: Vegetation has been differentiated by and attained an equilibrium with a particular frequency and intensity of burning.

FIRST-ORDER BELIEF: Conclusion reached through the senses or by experience which requires no empirical confirmation.

FOREGROUND-MIDDLEGROUND: The area visible from a travel route or use area to a distance of 3-5 miles. The outer boundary of this zone is defined as the point where texture and form of individual plants is no longer apparent in the landscape—vegetation is apparent only in patterns or outline.

FORM: The mass of an object(s) that appears unified.

HABITAT TYPE: The collective area, occupied by one vegetative association, which is the product of all ecological factors (soil, climate, topography, etc.) which produce it.

INTRUSION: A feature (land, vegetation, or structure) which is generally considered out of context with the characteristic landscape.

LACUSTRINE ADAPTATION: The orientation of a species or group to a lifeway based on the exploitation of lake-margin resources.

LAND ETHIC: A concept, put forward by Aldo Leopold, wherein a human being is part of a natural community rather than conqueror of it.

LANDSCAPE CHARACTER: The arrangement of a particular landscape as formed by the variety and intensity of the basic elements of form, line, color, and texture.

LINE: A point which has been extended; anything arranged in a row or sequence.

LITHIC: Pertaining to stone.

LIVESTOCK CLASS: The kind of domestic livestock which graze on range. It refers to cattle, sheep, or a combination. Class may be broken down further: cows with calves, yearlings, steers, ewes, ewes with lambs, lambs, etc.

LIVESTOCK DISTRIBUTION: The uniformity of livestock grazing use over a range area. It is affected by availability of water, by topography, and by type and palatability of vegetative species.

LIVESTOCK GRAZING LICENSE: An authorization which permits the grazing of a specified number and class of livestock on a designated area of BLM district grazing lands for a period of time, not to exceed one year.

LIVESTOCK OPERATION: The management of an area of land so that a significant portion of the income is derived from the continuing production of livestock.

LIVESTOCK OPERATOR: One who qualifies to graze livestock on public lands.

MIDDEN: A characteristic soil which develops on some archaeological sites as a result of the cultural introduction of organic materials. It is physically chemically, and often visually and tactilly distinct from non-cultural soils.

MULTIPLIER EFFECT: The direct and indirect effects for output, expressed as a single number, which indicates how much total sales will increase or decrease if final demand increases or decreases in a particular sector.

NATURAL AREA: An area where natural processes predominate and which is preserved for the primary purpose of research and education. Such areas may include (1) typical or unusual faunistic and/or floristic types, associations, or other biotic phenomena, or (2) characteristic or outstanding geologic or aquatic features and processes.

OBSIDIAN HYDRATION: An archaeological dating technique applied to volcanic glass. The technique is predicated on the gradual absorption of water in an ever-thickening layer on the surface of obsidians. The thickness of the hydration layer provides an index (although not an unequivocal one) of the age of the speciman.

OFF-ROAD VEHICLE (ORV): Any motorized vehicle designed for or capable of cross-country travel on or immediately over land, water, sand, snow, ice, marsh, swampland, or other terrain.

OPEN SITE: An archaeological site on open ground, that is, most site categories except caves, rockshelters, and petroglyphs.

OPPORTUNITY COSTS: The income foregone by not taking advantage of opportunity to sell at a high price.

QUALITY EVALUATION: A comparative measurement of the quality of recreation-use opportunities on public lands.

PASTURE: A subdivision of a grazing allotment on public lands.

PRIMITIVE AREA: A natural, wild, and undeveloped area essentially removed from the effects of civilization.

RANCH FUNDAMENTALISM: The persistence of a group of ranchers to continue in their given lifestyle despite the opportunities to sell their lands at a high price.

RANCH ADJUDICATION: The allocation of grazing allotments, season of use, numbers and class of livestock to qualified operators.

RANGE FACILITY: A structure, such as reservoirs, fences, etc., that facilitates livestock grazing on public lands.

RECREATION ACTIVITY OCCASION: A standard unit of recreation use consisting of one individual participating in one specific outdoor recreation activity during any portion or one day. One individual participating in three different activities during one day is recorded as three activity occasions.

REFERENCE GROUP: Any group to which an individual refers for comparing, judging, or deciding upon his opinions and behaviors.

ROADLESS: "The absence of roads which have been improved or maintained by mechanical means to ensure relatively regular and continuous use. A way maintained solely by the passage of vehicles does not constitute a road" (House of Representatives Report 94-1163, in reference to the Federal Land Policy and Management Act of 1976, P.L. 94-579).

SCENIC QUALITY: The quality of the scenery as determined through the use of the scenic evaluation process.

SEDENTARY: A settlement pattern characterized by year-round, year-after-year occupation of one site; contrasts with seasonal, transhumant, or migratory settlement.

SELDOM SEEN AREAS: Areas seen from low use volume transportation routes or beyond the 15-20 mile background zone for other routes.

SOCIOCULTURAL GROUP: A social grouping or set of people who reside and interact together and share cultural beliefs.

STAND: A plant community representative of a particular association.

STOCKING RATE: The degree to which a grazing unit is stocked with livestock, usually expressed in AUMs. The stocking rate may be more or less than the carrying capacity of the grazing unit.

TEXTURE: The visual result of the tactile surface characteristics of an object.

TOPOEDAPHIC CLIMAX: Climax vegetation differs from the climatic climax due to a combination of soil and topographic conditions.

TOPOGRAPHIC CLIMAX: Climax vegetation differs from climatic climax due to topographic conditions.

TRANSHUMANCE: Seasonal shifting of activity centers from lowland to mountain settings.

VEGETATION ZONE: The entire area over which one vegetative association is climatic climax.

VISUAL PROMINENCE ZONE: The area that can be seen as foreground-middleground, background, or seldom seen areas.

VISUAL RESOURCE MANAGEMENT (VRM): The planning, design, and implementation of visual resource management classes for all BLM resource management activities.

VISUAL RESOURCE MANAGEMENT (VRM) CLASSES: The degree of alteration that is acceptable within the characteristic landscape. The classes are based upon the physical and sociological characteristics of any given homogeneous area.

VISUAL SENSITIVITY LEVEL: An index of the relative importance or value of visual response to an area in relation to other areas.

WILDERNESS STUDY AREAS: Roadless areas of 5,000 acres or more and roadless islands of public lands identified as having wilderness characteristics described in the Wilderness Act of 1964 (P.L. 88- 577).

ZOOTIC DISCLIMAX: Vegetation has been differentiated by and attained an equilibrium with a particular and degree of animal influence.

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APPENDICES

Appendix A

BROWSE CONDITION STANDARDS

The following browse condition standards are based on *Range Environmental Analysis Handbook*, (U.S. Forest Service, California Region, 1969, Sections 740, 751, 760, 852.3).

Browse Form Classes

1. All available, little or no hedging.
2. All available, moderately hedged.
3. All available, heavily hedged.
4. Largely available, little or no hedging.
5. Largely available, moderately hedged.
6. Largely available, heavily hedged.
7. Mostly unavailable.
8. Unavailable.

These browse form classes are arbitrary divisions that aid in describing the condition of the browse stand. In classifying browse for form class, it should be remembered that unavailability may be the result of height (over 5 feet), location (near a rock or cliff), or density. Degree of hedging is the amount a shrub or tree is browsed back from its normal shape. Hedging is the result of past use and should not be confused with current cropping. Lightly hedged shrubs are browsed to the extent that there is loss of vigor and indication of decadence. All others should be classed as moderately hedged.

Condition of Browse Stands

1. Satisfactory—Not more than 15 percent of preferred species or 5 percent of staple species in form classes 3 and 6 (heavily hedged).

2. Unsatisfactory—a. More than 15 percent of preferred species or 5 percent of staple species in form classes 3 and 6 (heavily hedged). b. Preferred species have declined to remnant stage or minor occurrence relative to site potential as determined from evidence of death loss. Where staple or low-value plants appear as sole components of the browse stand, condition may be rated as satisfactory if less than 5 percent of staple plants have been heavily hedged.

Game Range Condition Standards

1. Satisfactory—Condition of browse satisfactory, and no active accelerated erosion.

2. Unsatisfactory—a. Condition of the browse unsatisfactory regardless of soil condition. b. Condition of browse satisfactory, but active accelerated soil erosion present on area.

Appendix B

VEGETATION MONITORING SYSTEMS

The monitoring of vegetation, soils, and water responses to grazing management is essential to the success of the allotment management plans. Periodic management adjustments will be necessary to achieve management objectives. Short-term responses and developing long-term trends must be recognizable for optimizing resource allocations.

Vegetation Monitoring

Vegetation trend will be monitored in a multifaceted program of studies. Stratification by habitat types is necessary to measure overall improvement in range condition. Assessment of more immediate responses to specific pasture use necessitates stratification by pastures within allotments. Habitat types especially critical to wildlife will receive separate attention.

Methods selected will minimize observer biases, require a minimum amount of time, and yet will yield valuable quantitative data. Canopy coverage, the percentage of the ground included in a vertical projection of imaginary polygons drawn about the total natural spread of foliage of the individuals of a species (Daubenmire, 1959), serves as a criterion of relative dominance, of potential productivity, of the influence of plants on precipitation and light interception and soil temperature, and of the value of vegetation to animals. It permits comparison on a common basis of all plants, since plot size has no influence on the data; and evaluations precise enough for research purposes do not require excessive field time (Daubenmire, 1968). Frequency, the percentage of occurrence of a species in a series of samples of uniform size contained in a single stand, the numbers and sizes of plants in each sample being ignored (Daubenmire, 1968), is easier to measure than canopy coverage, requires less time, further minimizes personal observer bias, and readily shows changes in vegetative composition. Both parameters are used extensively throughout this monitoring system.

General location of key areas for vegetation monitoring as shown in TABLE B-1 are related to the location of the key habitat types within each of the allotments which share intrinsic values of various resource components. In many cases these habitat types are not only important for domestic livestock grazing but stand out as dominant factors in wildlife and watershed conservation. Each habitat type sample will be surveyed on the ground to determine the most representative sampling site or key area to be sampled to provide the best cross section of indicators for the particular habitat type. Key areas will be selected which will allow monitoring of crucial resource values represented.

Key species will be selected which will allow successional trends to be determined and utilization estimates to be made. Selection of key species to be monitored for utilization will depend upon the variety and intensity of grazing use by all consumptive uses. Bitterbrush, aspen, bluebunch wheatgrass, Thurber's needlegrass, Idaho fescue, Sandberg bluegrass, and squirrel tail will be monitored on selected areas. Cross-sectional sampling may represent various combinations of such key species or others depending upon the frequency and density of such species and their relative value to the key area.

HABITAT TYPES (23)

The overall objective of the rest-rotation grazing systems is to improve range condition by initiating and maintaining an upward trend in vegetation toward site potentials. Two stands representative of each of 23 habitat types will be monitored. Each stand received use by livestock during the 1976 grazing season and is expected to demonstrate effects of changed grazing management. The stands are widely dispersed throughout the Tuledad and Home Camp planning units (TABLE B-1).

Shrub canopy cover and density (the number of individuals per unit area) will be measured by the line intercept method (Canfield, 1941) and belt transects, respectively. Herbaceous vegetative cover will be measured in quadrats (FIGURE B-1).

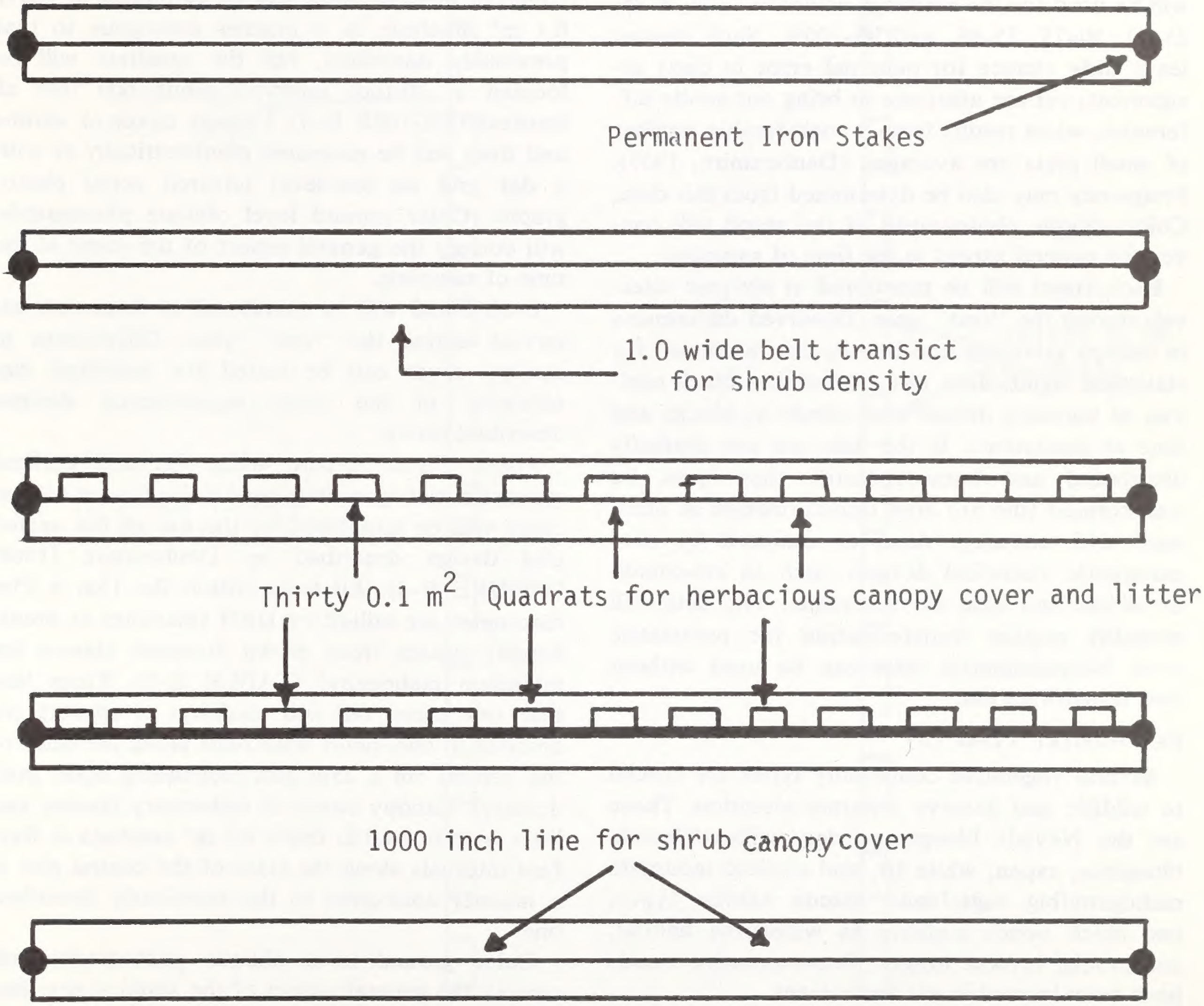
Three to five 1,000-inch lines (the number of lines varying with the heterogeneity of the vegetation) will be used for shrub canopy cover. The intercepted length of the live portion of the canopy of each shrub will be recorded. Age and form classes (U.S. Dept. Int., BLM, 1969b) of all intercepted shrubs will also be determined. The number of individuals of each shrub species rooted within one-half meter of each side of each 1,000-inch line will be recorded.

TABLE B-1
LOCATIONS OF VEGETATION MONITORING STANDS, STRATIFIED BY KEY HABITAT TYPES

Habitat Type	Allotment	Legal Description
meadow (NV23-23)	Tuledad Common	SE¼, NE¼, sec. 21, T35N, R18E
meadow (NV23-23)	Home Camp	NW¼, SE¼, sec. 16, T40N, R19E
meadow (NV23-13)	Duck Lake	SE¼, NW¼, sec. 4, T38N, R19E
meadow (NV23-13)	Bare	SE¼, NE¼, sec. 33, T38N, R21E
meadow (NV23-13)	Wall Canyon	SE¼, SE¼, sec. 9, T39N, R20E
meadow (NV23-13)	Denio	NE¼, NW¼, sec. 16, T39N, R22E
meadow (NV23-13)	Tuledad Common	center W½, sec. 5, T37N, R17E
meadow (NV23-13)	Home Camp	SE¼, sec. 12, T39N, R18E
aspen	Home Camp	SW¼, SE¼, sec. 12, T39N, R18E
aspen	Bare	center SW¼, sec. 5, T36N, R22E
aspen	Gridley	center SW¼, sec. 6, T37N, R16E
aspen	Tuledad Common	NW¼, NE¼, sec. 20, T37N, R17E
aspen	Alaska Canyon	NW¼, NW¼, sec. 20, T37N, R17E
aspen	Duck Lake	SW¼, SW¼, sec. 28, T39N, R18E
white fir	Tuledad Common	NE¼, NE¼, sec. 13, T37N, R16E
white fir	Gridley	NE¼, NW¼, sec. 6, T37N, R16E
mountain mahogany	Tuledad Common	center N½, sec. 8, T37N, R17E
mountain mahogany	Bare	center SW¼, sec. 5, T36N, R22E
mountain mahogany	Home Camp	SW¼, SE¼, sec. 11, T39N, R18E
mountain mahogany	Gridley	center, sec. 20, T37N, R16E
willow riparian	Tuledad Common	SE¼, sec. 13, T39N, R16E
willow riparian	Tuledad Common	SW¼, sec. 5, T37N, R17E
willow riparian	Alaska Canyon	NW¼, NW¼, sec. 23, T37N, R16E
willow riparian	Home Camp	N½, NE¼, sec. 32, T40n, R19E
willow riparian	Bare	E½, SE¼, sec. 31, T37N, R22E
waterfowl habitat	Bare	
waterfowl habitat	Tuledad Common	
waterfowl habitat	Tuledad Common	

FIGURE B-1

Schematic Outline of Shrub Comunity
Monitoring Design


Permanent Iron Stakes
1.0 wide belt transict
for shrub density
Thirty 0.1 m² Quadrats for herbacious canopy cover and litter
1000 inch line for shrub canopy cover

(Drawing is not to scale)

Density of juniper will be determined in five 0.1 acre circular plots (radius 37.25 feet) spaced at 75-foot intervals. Basal area (the aggregate cross-sectional area of the individual plants measured at or near the ground surface, per unit area of land) and canopy coverage will be determined by measurement of the root crown and canopy diameters of each tree rooted within the plots.

Canopy cover of all herbaceous species, litter and basal cover (basal area expressed as a percentage of ground area) of all bunchgrasses will be estimated in thirty 0.1 m.^{2} (50cm x 20cm) quadrats located at five-foot intervals along two of the 1,000-inch lines. A series of unequal classes will be used for the coverage estimates: 0-5, 5-25, 25-50, 50-75, 75-95, and 95-100%. Such classes leave little chance for personal error in class assignment, yet are adequate to bring out subtle differences when results from a considerable number of small plots are averaged (Daubenmire, 1959). Frequency may also be determined from this data. Color oblique photographs of the stand will convey the general aspect at the time of sampling.

Each stand will be monitored at six-year intervals during the "rest" year. Observed differences in canopy coverage and density can be tested for statistical significance in a randomized block analysis of variance design with stands as blocks and time as treatments. If the data are not normally distributed and homoscedastic, they must be transformed (the arc sine transformation is often used with coverage data) or analyzed by nonparametric statistical designs such as chi-square as blocks and time as treatments. The data will probably require transformation for parametric tests. Nonparametric tests can be used without data transformation.

KEY HABITAT TYPES (5)

Several vegetative community types are crucial to wildlife and deserve separate attention. These are the Nevada bluegrass-sedge, willow/Nevada bluegrass, aspen, white fir, and curlleaf mountain mahogany/big sage/Idaho fescue habitat types, and stock ponds suitable as waterfowl habitat, and crucial browse ranges. Representative stands have been located in each allotment.

Nevada Bluegrass-Sedge Habitat Type. Canopy cover of herbaceous vegetation and litter and basal cover of bunchgrasses will be estimated in thirty 0.1 m^2 quadrats (FIGURE B-2) as described above. Canopy cover of shrubs will be measured planimetrically or with a dot grid on low-level infrared aerial photographs taken by procedures described by Meyer (1973). Such photographs will also be useful in evaluating any advancement or healing of gully head-cuts. Color ground level oblique photographs will convey the general aspect of the stand at the time of sampling.

Each stand will be monitored at three-year intervals during the "rest" year. Differences in canopy cover can be tested for statistical significance in the same experimental designs described above.

Willow/Nevada Bluegrass Habitat Type. Canopy cover of herbaceous species and litter and basal cover of bunchgrasses will be estimated in thirty 0.1 m^2 quadrats in a manner analogous to that previously described, but the quadrats will be located at 20-foot intervals along 600 feet of transect (FIGURE B-3). Canopy cover of shrubs and trees will be measured planimetrically or with a dot grid on low-level infrared aerial photographs. Color ground level oblique photographs will convey the general aspect of the stand at the time of sampling.

Each stand will be monitored at three-year intervals during the "rest" year. Differences in canopy cover can be tested for statistical significance in the same experimental designs described above.

Forest Types. Aspen, white fir, and curlleaf mountain mahogany/big sage/Idaho fescue habitat types will be monitored by the use of the nested plot design described by Daubenmire (1968) (FIGURE B-4). All trees within the 15m x 25m macroplot are tallied by DBH (diameter at breast height) classes (root crown diameter classes for mountain mahogany) (TABLE B-2). Trees less than one meter tall and seedlings or sprouts are counted in one-meter wide belts along the sides of the central 5m x 25m plot (depending upon their density). Canopy cover of understory species and litter is estimated in thirty 0.1 m^2 quadrats at five-foot intervals along the sides of the central plot in a manner analogous to the previously described one.

Color ground level oblique photographs will convey the general aspect of the stand at the time of sampling. Low-level infrared photographs will demonstrate gross changes.

Each stand will be monitored at three-year intervals during the "rest" year. Differences in frequency distributions of tree diameter classes

FIGURE B-2

Schematic Outline of Quadrat Layout For Nevada Bluegrass-Sedge Habitat Type

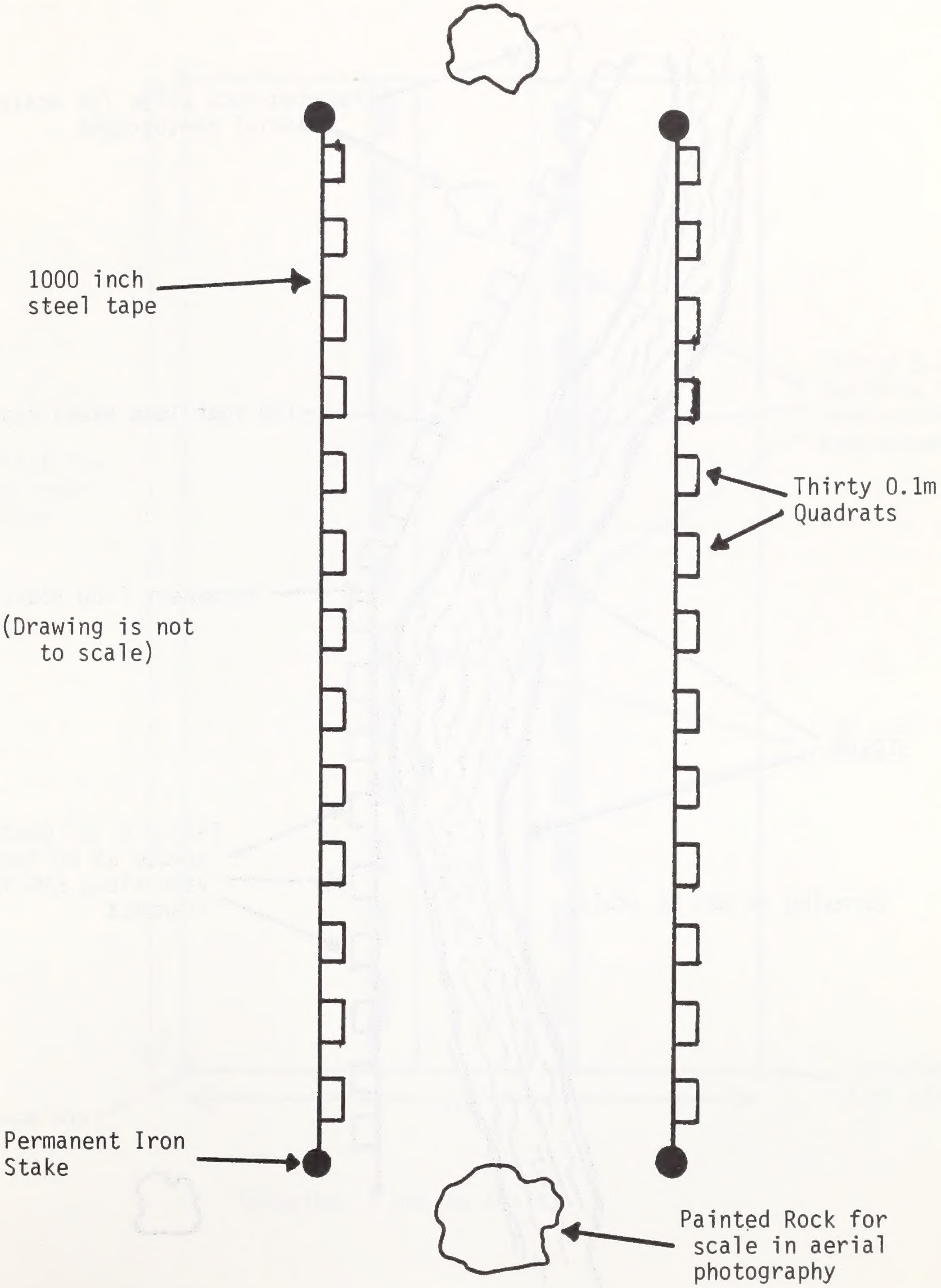

1000 inch steel tape
(Drawing is not to scale)
Permanent Iron Stake
Thirty 0.1m Quadrats
Painted Rock for scale in aerial photography

FIGURE B-3

Schematic Outline of Quadrat Layout for Willow/Nevada Bluegrass communities

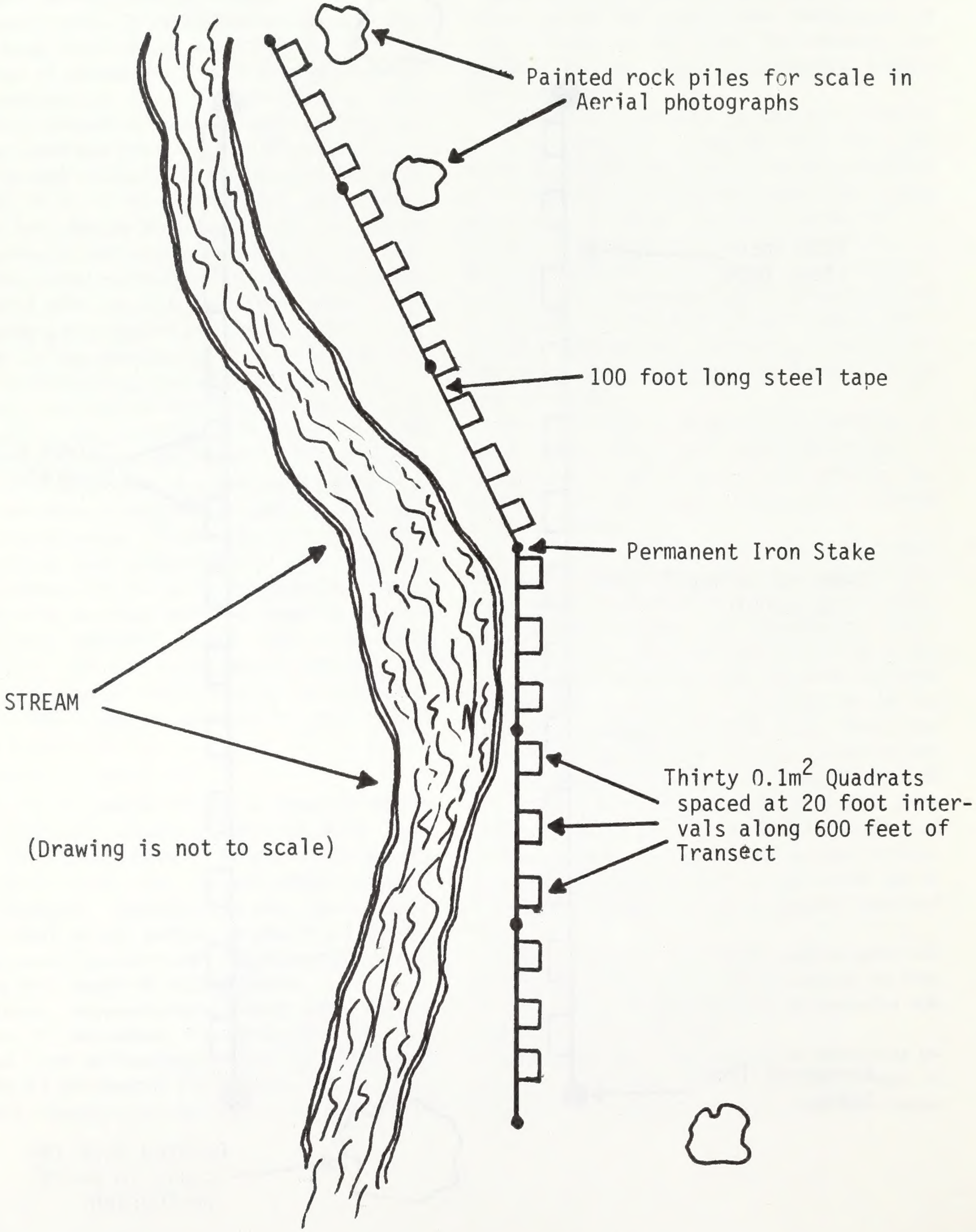
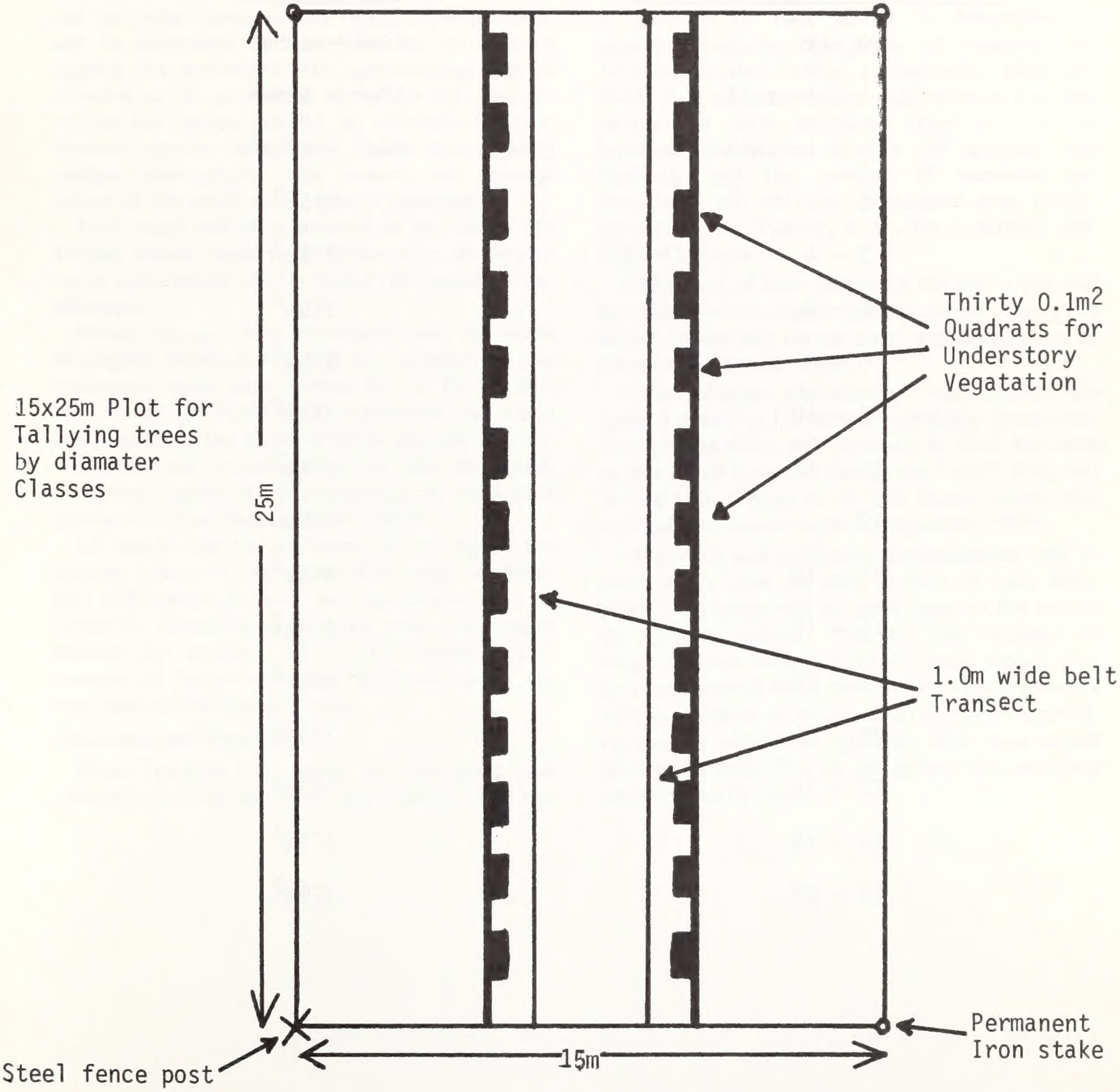

Painted rock piles for scale in Aerial photographs
100 foot long steel tape
Permanent Iron Stake
STREAM
Thirty 0.1m² Quadrats spaced at 20 foot intervals along 600 feet of Transect
(Drawing is not to scale)

FIGURE B-4

Schematic Outline of Nested Plot Design
For Forest Types (After Daubenmire, 1968)


15x25m Plot for Tallying trees by diamater Classes
25m
Thirty 0.1m^2 Quadrats for Understory Vegatation
1.0m wide belt Transect
Permanent Iron stake
Steel fence post
15m

(Drawing is not to scale)

TABLE B-2
DIAMETER SIZE CLASSES FOR TALLYING TREES IN NESTED PLOT DESIGN

Diameter Size Class (inches)	Area Sampled
0 - 1	$50m^2$ - $125m^2$
1m tall	$50m^2$ - $125m^2$
1m tall	$50m^2$ - $125m^2$
1 - 2	$375m^2$
2 - 4	$375m^2$
4 - 6	$375m^2$
6 - 8	$375m^2$
8 - 10	$375m^2$
10 - 12	$375m^2$
12 - 14	$375m^2$
14 - 16	$375m^2$
16 - 18	$375m^2$
18 - 20	$375m^2$
20 - 22	$375m^2$
22 - 24	$375m^2$
24 - 26	$375m^2$
26 - 28	$375m^2$

can be tested for statistical significance with a chi-square analysis. Differences in canopy cover of understory vegetation can be tested with a paired-sample test.

Waterfowl Habitat. The importance of residual shoreline and upland vegetation to waterfowl nesting success of the following year has been well documented (Bue, et al., 1952; Shearer, 1960; Keith, 1961; Uhlig, 1963; Mundinger, 1976). Two stands, one representative of shoreline vegetation and the other representative of upland vegetation, will be monitored at each lake and stock pond suitable for waterfowl. The methodology will be identical to the previously described (i.e., line intercept for shrubs and 0.1 m^2 quadrats for herbaceous species and litter). Color ground level oblique photographs will convey the general aspect of the stand at the time of sampling.

Each stand will be monitored at the end of the grazing season each year. Differences in canopy cover and density can be tested for statistical significance.

Browse Ranges. Key bitterbrush and mountain mahogany communities will be sampled by the permanent circle plot method (U. S. Forest Service, 1969) (FIGURE B-5). Condition and trend are judged on the basis of form and age classes. Utilization will be determined as light, moderate, or severe, based on the percentage of twigs used (Bureau of Land Management, 1969b).

All stands will be monitored at the end of the grazing season of each year. Frequency distribution differences in form and age classes can be tested for statistical significance with a chi-square analysis for goodness of fit. Differences in percentage of twigs used can be tested in an appropriate paired-sample design.

Allotment and Pastures

These studies will focus on utilization and changes in abundance of key species on key areas. Optimum locations will depend upon the success of water developments and the finalization of fencelines. The choice of key species will vary with the habitat type and condition of each key area. Two increaser species and two decreaser species will be selected for each key area.

Changes in abundance of key species will be measured by the frequency sampling procedure described by Tueller, et al. (1972), where presence or absence of root crown is determined in quadrats enabling calculation of frequency by transects nested within a macroplot (FIGURE B-6). Two such macroplots will be located in each pasture of each allotment. The size of the quadrats used, the number of quadrats per transect, and the number of transects per macroplot will vary in accordance with recommendations by Tueller, et al., for improved sampling efficiency.

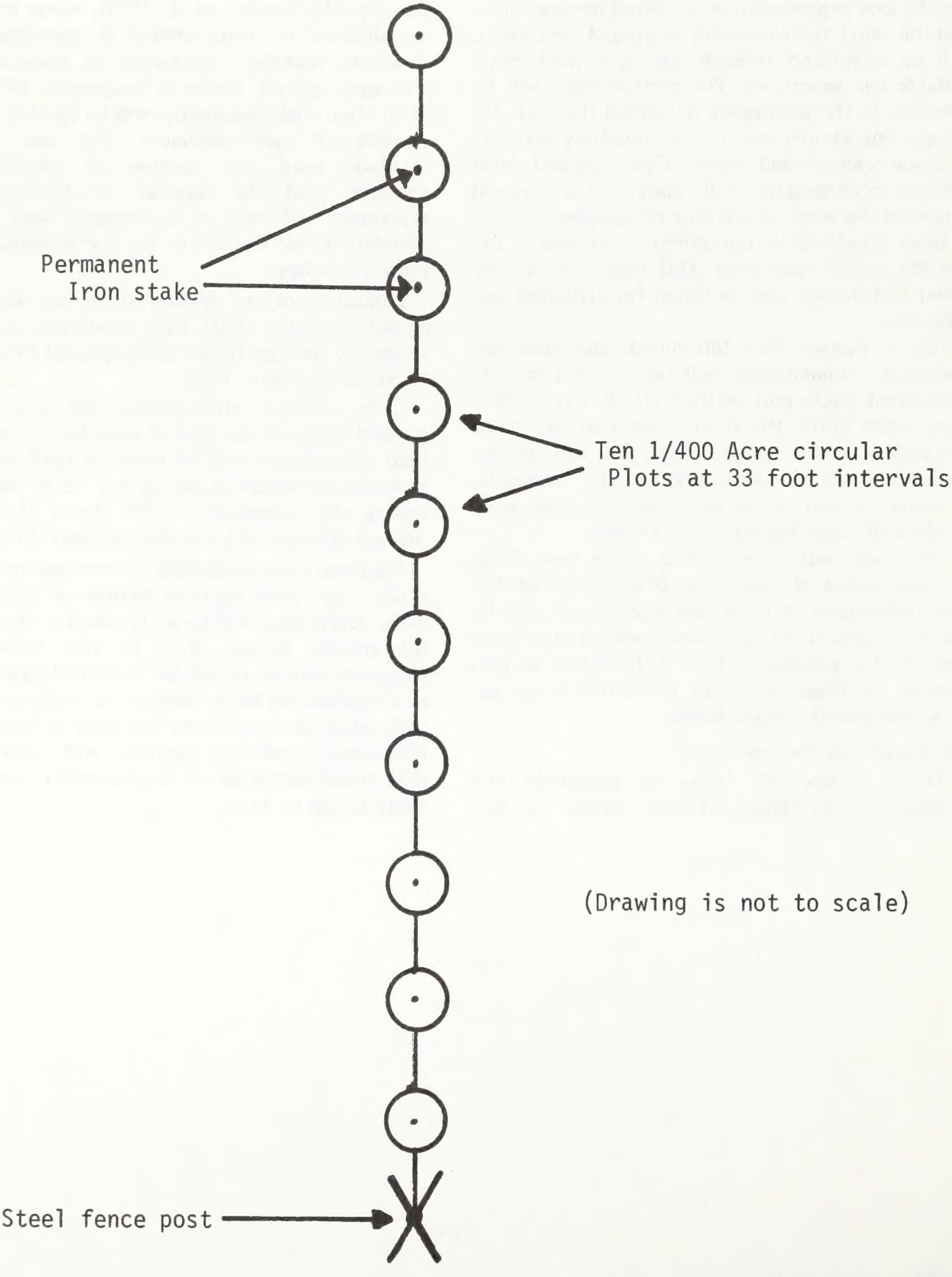
Utilization of key species in the key areas will be determined as slight, light, moderate, heavy, or severe by the key forage plant method (Bureau of Land Management, 1968).

Color oblique photographs will convey the general aspect at the time of sampling. Stereo vertical photographs will be taken in each key area at three-year intervals during the "rest" year, following the procedure of the stereo photo plot method (Bureau of Land Management, 1972).

Frequency and utilization determinations will be made every year on each pasture of each allotment. Utilization will be determined at the end of the grazing season. Year to year changes in frequency can be tested for statistical significance in a randomized block analysis of variance design with macroplots as blocks and time as treatments. Parametric statistical analysis with appropriate data transformations or nonparametric statistical analysis can be used.

FIGURE B-5

Schematic Outline of Permanent Circle Plot Transect for Browse Ranges (After U.S. Forest Service, 1969)

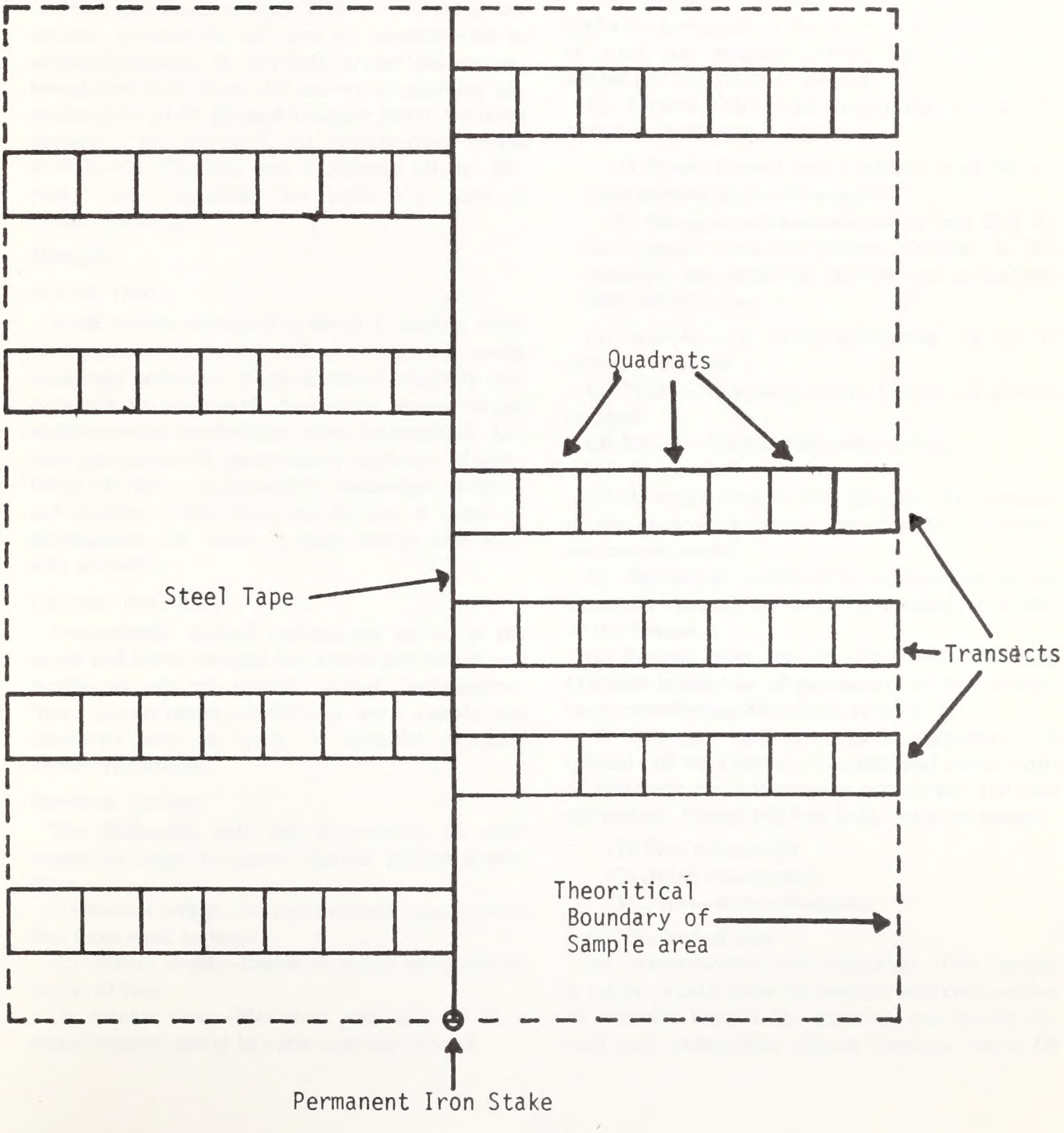


Permanent Iron stake
Ten 1/400 Acre circular Plots at 33 foot intervals
(Drawing is not to scale)
Steel fence post

FIGURE B-6

Schematic Outline of a Macroplot for Frequency Determinations (After Tueller Et Al.,1972)

(Drawing is not to Scale)



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Appendix C

PHYSICAL AND BIOLOGICAL STREAM SURVEYS

Introduction

The objective of physical and biological stream surveys is to provide a record of the condition of the aquatic habitat as it relates to fish. Included is an analysis of chemical elements present in the water and the aquatic foods available for fish. An electro-shocking survey was conducted by BLM and California Department of Fish and Game (CDFG) personnel in July 1975 to determine the species, abundance and size of resident fish in selected streams. A physical stream survey followed one year later. All survey procedures are outlined in BLM Manual Chapter 6671, "Stream Survey." Bureau of Land Management Form 6670-2, "A Physical and Biological Stream Report," was completed for each 0.25 mile of stream surveyed.

Methods

SURVEY UNITS

Each stream surveyed is given a starting point (downstream terminus) and a termination point (upstream terminus). Each terminus generally corresponds to a property boundary, stream origin and/or stream termination point. Intervals of 0.25 mile are paced off, permanently marked and numbered in order to accurately determine distance and location points along the stream. A series of photographs are taken at each survey unit (0.25 mile marker).

GRAZING STATIONS

Permanently marked stations are set up at the upper and lower termini and above and below any confluents into the stream. Annual temperature, flow, stream depth, width and water quality are measured here in order to monitor changing stream conditions.

PHYSICAL SURVEY

The following data are ascertained in each stream in order to assess aquatic habitat conditions.

(1) Stream width—Wetted distance measured in feet from bank to bank.

(2) Stream depth—Depth of pools measured in tenths of feet.

(3) Stream flow—Measured with the aid of a water velocity meter in cubic feet per second.

(4) Stream gradient—An estimate of slope from flat (0-1%) to steep (2.5%).

(5) Turbidity—An estimate of water visibility of pools measured in feet.

(6) Conductivity—Total dissolved solids present in the stream.

(7) pH—The acidity alkalinity of the stream.

(8) Temperature—A continual 45-day record of high and low temperatures is collected with the aid of thermographs.

(9) Dissolved oxygen—In ppm, the total amount of dissolved oxygen present in the water.

(10) Condition of the benthos—An estimate taken by personnel of the number of square yards of good and marginal gravel, pools, riffles and rubble per 110 yards of stream.

(a) Gravel—All rocks measuring 0.1 to 3.0 inches in diameter.

  (1) Good—Gravel with a minimum of silt and sand present in the interspaces.

  (2) Marginal—Gravel measuring less than 0.1 but greater than 0.5 inches. Gravels in this category are generally shallow and compacted with silt and sand.

(b) Rubble—All rocks measuring 3.0 to 12 inches in diamter.

(c) Pools—All placid waters 1.0 foot or greater in depth.

(d) Riffles—Faster, shallower waters.

(11) Vegetation

(a) Average stream area shaded—An estimate of the percent of stream area shaded by canopy and canyon walls.

(b) Streamside cover—The composition of the dominant vegetative communities along the course of the stream.

(c) Percent bank erosion—An estimate in each 110-yard subsection of the amount of bare streambank contributing directly to erosion.

(d) Emergent and submergent vegetation—An estimate of the number of square and linear yards of emergent and submergent growth per 110-yard subsection. Found 100 feet back from the stream:

  (1) Tree community
  (2) Brush community
  (3) Grass—forb community

(12) Biological data

(a) Macro-invertebrate sampling—This sample is taken to determine the number and composition of desirable (caddis fly, stonefly, and mayfly larvae) and undesirable species (leaches, black fly larvae, giant water beetles and preduceous diving beetles) of fish food.

Measurements are taken with a surber sampler (square foot bottom sampler made of nylon mesh). Four samples are collected in each survey unit.

(13) Limiting factors

(a) Barriers—This includes the number, type, height and corrections needed for, each barrier identified. Barrier types include:

(1) Falls
(2) Dams
(3) Log jams
(4) Culverts

(b) Pollution sites—This includes the identification and location of sources of pollution to the stream:

(l) Erosion sites.
(2) Campgrounds.
(3) Irrigation ditches.

(14) Accessibility—Includes the identification of roads, bridges, trails, etc., which will aid future investigation. Indicate all public or private access that is available.

(15) Additional Comments—A listing of pertinent comments which may help in evaluating the habitat. This may include:

(a) The influence of land-use practices on the stream.

(b) Sketches and drawings of pertinent obstructions, ad pollution sites, etc.

(c) Improvement sites and recommendations.

(16) Electro-shocking of fish—An electroshocking program is developed to determine the species, size, abundance and location of fish in each stream.

(a) Permanent transects (100 yards in length) are established in each stream prior to shocking.

(b) BLM and Department of Fish and Game personnel cooperate in the sampling.

(c) All fish shocked are identified, sized, fin clipped and returned to the approximate location where taken.

(d) Population estimates (fish/100 feet of stream) are calculated following sampling.

Appendix D

FISHERIES MONITORING SYSTEM

Location

BARE CREEK

(1) Located 80 yards below the dam at Newland Reservoir. NW¼ NW¼, Section 7, Township 37N., Range 17E.

(2) Located 300 yards upstream from the Stevenson Cabin, Newland Meadows. NW¼ NW¼, Section 6, Township 37N., Range 17E.

(3) Located 35 yards above the confluence of Silver Creek. SW¼ NE¼, Section 20, Township 38 N., Range 17E.

(4) Located 200 yards above BLM boundary. SE¼ NW¼, Section 20, Township 38N., Range 17E.

SILVER CREEK

(1) Located 90 yards above the confluence of Bare Creek. SW¼ NE¼, Section 20, Township 38N., Range 17E.

Type of Data Collected

The following data are ascertained during high and low flow periods each year.

(1) *Stream width.* Will be measured with a steel tape (in feet). This will be the wetted distance from bank to bank.

(2) *Stream depth.* (Measured in feet.) This will be the averaged stream depth taken on a line run perpendicular to the course of the stream.

(3) *Stream flow.* (Measured in cubic feet per second.) Measurement will be taken with the aid of a water velocity meter.

(4) *Turbidity.* (Measured in visibility per foot.) An estimate of water visibility.

(5) *Conductivity.* (Total dissolved solids present in the stream.)

(6) *pH.* (Hydrogen ion concentration.) Measurements will be taken with the aid of a Hache Chemical Kit.

(7) *Temperature.* (Measured in degrees Fahrenheit.) Measurements will be taken with the aid of a mercury pocket thermometer.

(8) *Dissolved oxygen.* (Measured in ppm.) The total amount of dissolved oxygen present in the water.

APPENDIX E

IN REPLY REFER TO

United States Department of the Interior

BUREAU OF LAND MANAGEMENT
District Office
P. O. Box 1090
Susanville, California
96130

February 10, 1977

INSTRUCTION MEMO NO: SDO-76-5, Change No. 1
Expires: 12/31/77

TO: Susanville District Personnel

FROM: District Manager, Susanville

SUBJECT: Susanville District Policy on Private Investment on National Resource Lands and Maintenance of Range Improvement Projects.

While situations may occur which require individual consideration, the following general rules will apply. Repair and maintenance, as required, shall mean normal upkeep and maintenance necessary to preserve, protect, and prolong the useful life of the improvements, but shall not include major repairs where the damage is due to vandalism, floods, earthquakes, fire or Acts of God, not the result of fault or negligence of the cooperator(s) as determined by the authorized officer.

1. WELLS:
   A. Construction - The Bureau will furnish the hole and casing. The rancher will provide all facilities on the wells. If special design of drinking facilities is required for wildlife, the BLM will furnish these.

   B. Maintenance - The rancher will maintain all well facilities with the exception of wells determined by the Bureau to be operated during the nongrazing season for wildlife. The latter will be maintained full time by the Bureau. It will also be the Bureau's responsibility to turn such wells on and off during the nongrazing season.

2. SPRINGS:
   A. Construction - The Bureau will do the construction and development work on all springs.

   B. Maintenance - The rancher will maintain all spring developments.

3. FENCES:

A. Construction - The Bureau will construct all fences.

B. Maintenance - The rancher will maintain all grazing management fences. BLM will maintain fences constructed for habitat or cultural resource benefit.

4. CATTLEGUARDS:

A. Construction - The Bureau will furnish and install cattleguards on roads which are segments of the District Transportation Plan. The Bureau will furnish and the ranchers or the county will install cattleguards for county roads on national resource lands.

B. Maintenance - The Bureau will maintain Bureau-installed cattleguards. The ranchers or the county will maintain all others.

5. PIPELINES:

A. Construction - The Bureau will do the construction and development work on all pipelines and related facilities.

B. Maintenance - The rancher will maintain all pipeline facilities with the exception of pipelines determined by the Bureau to be operated during the nongrazing season for wildlife. The latter will be maintained full time by the Bureau. It will also be the Bureau's responsibility to turn such pipelines on and off during the nongrazing season.

6. RESERVOIRS:

A. Construction - The Bureau will construct all reservoirs.

B. Maintenance - The Bureau will maintain all reservoirs.

Cooperative agreements are preferred to authorize private investment on national resource lands rather than Section 4 or 15 permits.

Area Managers will insure that cooperative agreements clearly state who is responsible for what maintenance as well as a commitment and time schedule for both deposited and undeposited contributions and for existing as well as new projects.

Distribution
W-412 (2)
DSC-700 (3)
CSO-952.2 (2)

Appendix F

1976 VEGETATION STUDIES

Introduction

Sampling of the habitat types described in Chapter 2 was conducted during June-October, 1976. Winter and spring (December-May) precipitation during 1975-1976 was 5.4 inches in Cedarville, compared to the 30-year average of 9.2 inches (Environmental Data Service, 1975, 1976). Consequently, some plants, particularly annuals, may appear more poorly represented than would be the case in more normal years. Although it would have been desirable to revisit each stand several times through the year, time limitations permitted only one visit. Sampling was begun in communities at the lower elevations and progressed to higher elevations. The number of stands sampled per habitat type varied with the land area occupied by each habitat type and its heterogeneity. Sampling was restricted to publicly owned lands.

Tables F-1 and F-2 provide acreages of each habitat type by allotment and the acreages of each habitat type excluded from grazing.

METHODS

The methods described below are discussed in greater detail in the vegetation monitoring system appendix.

Shrub Communities. Canopy coverage of shrubs was determined by the line-intercept method (Canfield, 1941) using 1,000-inch lines. Canopy coverage of juniper was measured in 0.1 acre circular plots spaced at 75-foot intervals along a transect line. Adequacy of sampling was determined separately for each stand by use of a mean-cover-sample-size curve (i.e., analogous to a species-area curve) for major species. Form and age classes (Patton and Hall, 1966) were tallied for all intercepted shrubs. Canopy coverage of herbaceous species was estimated in thirty 0.1 m^2 (2 dm x 5 dm) quadrats located at five-foot intervals along two of the lines used for intercept measurements (a modification of Daubenmire, 1959). Fecal groups of cattle, horses, deer, antelope, and sheep were counted (irrespective of age) within one meter on either side of each line used for intercept measurements.

Meadow Communities. Canopy coverage of herbaceous species and shrub seedlings was estimated in thirty 0.1 m^2 quadrats located at five-foot intervals along two 1,000-inch lines. Fecal groups were counted, as described above. Canopy coverage of shrubs and trees was determined from low-level infrared aerial photographs of each meadow. Photographs were taken using procedures described by Meyer (1973).

Willow Riparian Communities. Canopy coverage of herbaceous species was estimated in thirty 0.1 m^2 quadrats located at 20-foot intervals along six 100-foot lines paralleling the stream. Canopy coverage of shrubs and trees was determined from low-level infrared aerial photographs.

Forest Communities. White fir, aspen, and curlleaf mountain mahogany communities were sampled using a modification of Daubenmire's (1968) system of nested plots. Density of trees by diameter at breast height (root crown diameter for mountain mahogany) size classes was determined in a 15 m x 25 m plot. Canopy coverage and frequency of understory species were estimated in thirty 0.1 m quadrats located at five-foot intervals along two lines running the length of the 15 m x 25 m plot and dividing it equally into three 5 m x 25 m plots. Fecal groups (as described above) were counted within one meter on either side of these two lines. Age and form classes (Patton and Hall, 1966) were tallied for all mahogany individuals in the sample plots.

Browse Ranges. Condition and trend of key bitterbrush and mountain mahogany browse ranges (irrespective of habitat type) were sampled using the permanent circle-plot method (USDA, Forest Service, 1969).

Range Trend. Although form and age classes of shrubs provide an indication of apparent trend, their value is limited in that the data represent a condition at one point in time. Availability of actual trend data (measurements on the same area at two points in time) was limited by the number of trend monitoring study sites established in previous years. Fifteen Parker-3-step transects established in 1958, 1960, and 1961, were relocated and sampled, and seventeen 5 ft. x 5 ft. stereo photo plot (U.S. Dept. Int., BLM, 1974) study sites established in 1970, 1972, and 1974 were revisited.

RANGE CONDITION

Canopy coverage and constancy of all species, frequency of herbaceous species, and species composition were calculated for each habitat type. Range condition (based on the departure from

257984 0136 F8775

TABLE F-1
ACREAGES OF HABITAT TYPE BY ALLOTMENT

		Habitat Type HT -												
Allotment	Pasture	1	2	3	4	5	6	7	8	9	10	11	12	13
Duck Lake	North	329	0	0	0	0	59	3,898	0	0	20	0	578	8
	West	1,064	1,946	93	0	32	3,521	999	0	0	16	532	4,918	7
	East	114	4	2	52	0	1,064	6,260	0	0	14	368	2,037	4
	TOTAL	1,507	1,950	95	52	32	4,644	11,157	0	0	50	900	7,533	19
Denio	South	0	0	5	0	134	4,579	28	0	0	0	0	0	48
	North	0	0	0	0	0	1	3,150	0	0	0	0	0	0
	East	0	0	160	0	814	1,031	2,809	15	20	0	0	0	70
	TOTAL	0	0	165	0	948	5,611	5,987	15	20	0	0	0	118
Home Camp	Hayes Canyon	1,466	0	9	39	0	106	12,885	874	0	0	0	0	209
	Hart Camp	751	6	0	0	7	2,324	10,030	48	10	0	0	0	1
	Grass Lake	395	32	1,265	0	5,446	0	5,106	125	56	0	0	312	43
	TOTAL	2,612	38	1,274	39	5,453	2,430	28,021	1,047	66	0	0	312	253
Lower Lake	South	5	289	0	0	0	1,181	49	0	0	1,049	199	0	10
	Middle	2	27	0	1	0	1,176	85	0	0	90	0	0	10
	North	419	66	0	1,237	67	1,425	385	0	0	0	134	0	11
	TOTAL	426	382	0	1,238	67	3,782	519	0	0	1,139	333	0	31
Tuledad	Coppersmith	5,334	12,209	33	0	926	4,695	6,992	0	482	85	289	4,252	12
	Cottonwood	6,174	747	133	0	1,643	3,157	21,425	0	511	0	0	1,137	5
	Bare Creek	2,774	900	6	0	0	2,731	13,570	2	0	0	13	0	94
	TOTAL	14,282	13,856	172	0	2,569	10,583	41,987	2	993	85	302	5,389	111
Selic-Alaska Canyon	East	0	0	0	0	0	0	2,125	0	0	0	0	0	14
	West	0	0	0	0	0	10	2,676	0	0	0	0	0	15
	TOTAL	0	0	0	0	0	10	4,801	0	0	0	0	0	29

TABLE F-1
ACREAGES OF HABITAT TYPE BY ALLOTMENT (Continued)

		Habitat Type HT -												
Allotment	Pasture	1	2	3	4	5	6	7	8	9	10	11	12	13
Bare	Hog Mountain	0	0	24	0	338	9,254	8,899	27	1	0	0	0	75
	Fox Mountain	0	0	0	0	35	3,098	12,194	38	0	0	0	0	43
	Clover Creek	85	0	0	0	303	10,245	17,741	73	0	0	0	0	316
	Duck Flat	0	0	0	0	653	7,863	761	26	0	7	702	4,718	0
	Hoover	0	0	0	0	600	4,750	355	0	0	0	0	2,300	0
	Old Camp	21	1,157	0	0	636	6,730	700	0	40	0	0	4,000	11
	TOTAL	106	1,157	24	0	2,565	41,940	40,650	164	41	7	702	11,018	445
Wall Canyon	Seeding	0	0	10	0	282	0	0	0	0	0	0	0	0
	East	25	0	0	0	0	562	5,438	0	0	0	0	0	0
	West	1,018	4	10	0	336	7	4,664	0	4	66	4	172	122
	TOTAL	1,043	4	20	0	618	569	10,102	0	4	66	4	172	122
Red Rock		25	0	0	0	0	0	1,214	0	0	0	0	0	10
Cold Springs		18	0	0	0	0	0	93	0	0	0	0	0	5
Cedar		0	0	0	0	0	0	154	0	0	0	0	0	0
Boot Lake		0	0	0	0	0	0	246	0	0	0	0	0	2
State Line		3	0	0	0	0	11	0	0	0	119	6	0	0
Clarks Valley		0	0	0	0	0	0	24	0	0	0	0	0	5
Corral		134	4	1	0	4	0	125	0	6	0	0	0	0
Highway		0	375	0	0	0	397	0	0	0	2	200	372	0
	TOTAL	20,156	17,766	1,751	1,329	12,256	69,977	145,080	1,228	1,130	1,468	2,447	24,796	1,150

Source: Summerfield and Bagley (1974).

TABLE F-1
ACREAGES OF HABITAT TYPE BY ALLOTMENT (continued)

		Habitat Type HT -											
Allotment	Pasture	14	15	16	17	18	19	20	21	22	23	24	25
Duck Lake	North	0	82	0	1,808	567	0	3,998	1,527	0	0	64	301
	West	0	105	0	4,101	669	0	625	3	0	106	186	0
	East	0	152	3	630	965	0	5,071	0	0	0	0	0
	TOTAL	0	339	3	6,539	2,201	0	9,694	1,530	0	106	250	301
Denio	South	110	0	0	0	14	0	641	3,272	0	0	0	0
	North	176	0	0	0	6	0	300	887	1	0	0	0
	East	407	0	259	0	8	0	259	1,367	0	0	0	18
	TOTAL	693	0	259	0	28	0	1,200	5,526	1	0	0	18
Home Camp	Hayes Canyon	2,274	199	31	8,696	1,201	32	3	36	0	71	311	0
	Hart Camp	3,046	121	461	4,210	760	0	16,508	32,489	0	0	0	0
	Grass Lake	1,800	76	8	2,609	751	8	22,166	4,985	0	0	76	0
	TOTAL	7,120	396	500	15,515	2,712	40	38,677	37,510	0	71	387	0
Lower Lake	South	0	48	0	29	264	0	0	0	0	0	2	0
	Middle	0	17	0	8	219	0	0	0	0	0	78	0
	North	0	42	0	2	347	0	0	0	0	0	0	0
	TOTAL	0	107	0	32	830	0	0	0	0	0	80	0
Tuledad	Coppersmith	0	3,859	0	9,946	758	752	1,072	0	18	484	1,474	912
	Cottonwood	0	4,984	0	10,744	519	19	1,457	1,458	0	400	2,446	645
	Bare Creek	5	3,390	5	4,505	1,193	937	0	0	1,098	113	71	675
	TOTAL	5	12,223	5	25,195	2,470	1,708	2,529	1,458	1,116	997	3,991	2,232
Selic-Alaska Canyon	East	5	5	9	0	23	1,413	0	0	0	0	0	200
	West	0	11	2	0	55	1,148	0	0	0	0	0	196
	TOTAL	5	16	11	0	78	2,561	0	0	0	0	0	396

TABLE F-1
ACREAGES OF HABITAT TYPE BY ALLOTMENT (continued)

		Habitat Type HT -											
Allotment	Pasture	14	15	16	17	18	19	20	21	22	23	24	25
Bare	Hog Mountain	2,662	3	18	0	127	0	1,410	10,673	6	18	0	80
	Fox Mountain	227	62	406	0	586	0	12,515	3,945	50	0	0	1,255
	Clover Creek	632	77	1,173	467	679	0	14,362	11,330	40	0	0	1,200
	Duck Flat	919	42	61	0	300	0	3,229	3,262	0	0	0	0
	Hoover	0	0	19	115	190	0	1,188	0	0	0	0	0
	Old Camp	0	0	0	0	345	0	2,750	0	0	0	0	0
	TOTAL	4,440	184	1,677	582	2,227	0	35,454	29,210	96	18	0	2,535
Wall Canyon	Seeding	0	0	0	20	0	0	2,266	518	0	0	0	0
	East	480	0	10	136	29	0	3,634	3,630	0	0	0	79
	West	0	138	8	5,594	753	0	2,238	1,148	3	0	0	0
	TOTAL	480	138	18	5,750	782	0	8,138	5,296	3	0	0	79
Red Rock		0	16	0	39	0	19	0	0	0	0	0	70
Cold Springs		0	18	0	46	0	23	0	0	0	0	0	5
Cedar		0	0	0	0	0	0	0	0	0	0	0	6
Boot Lake		0	0	0	1	0	0	0	0	0	0	0	141
State Line		0	0	0	1	0	0	0	0	0	0	0	0
Clarks Valley		0	0	0	0	0	0	0	0	0	0	0	1
Corral		0	4	24	737	23	0	252	84	0	15	0	0
Highway		0	0	0	0	0	0	0	0	0	0	0	0
	TOTAL	12,743	13,451	2,497	54,444	11,351	4,351	95,944	80,614	1,216	1,207	4,708	5,784

TABLE F-1
ACREAGES OF HABITAT TYPE BY ALLOTMENT (continued)

SYSTEMATIC AREA

Allotment	Pasture	Habitat Type HT - 26	27	28	Bad-lands	Rubble land	Rock out-crop	Misc.	Allot-ment Total	Pasture Total
Duck Lake	North	0	100	0	532	1,317	280	10		15,478
	West	0	210	0	4,429	2,830	163	20		26,575
	East	0	510	0	1,857	2,501	590	17		22,215
	TOTAL	0	820	0	6,818	6,648	1,033	47	64,268	
Denio	South	0	56	0	2,853	0	0	0		11,740
	North	0	0	0	2	174	176	0		4,873
	East	0	0	0	0	854	0	0		8,091
	TOTAL	0	56	0	2,855	1,028	176	0	24,704	
Home Camp	Hayes Canyon	570	100	0	0	4,623	812	25		34,572
	Hart Camp	68	41	0	982	2,435	684	25		75,007
	Grass Lake	0	0	0	224	1,479	566	75		47,603
	TOTAL	638	141	0	1,206	8,537	2,062	125	157,187	
Lower Lake	South	0	0	0	0	835	49	20		4,029
	Middle	0	0	0	0	2,355	21	24		4,093
	North	0	0	0	133	3,125	63	20		7,476
	TOTAL	0	0	0	133	6,295	133	64	15,598	
Tuledad	Coppersmith	5	50	0	282	4,249	843	250		60,263
	Cottonwood	40	192	0	998	2,182	1,719	150		62,885
	Bare Creek	10	460	420	13	3,221	876	148		37,230
	TOTAL	55	702	420	1,293	9,652	3,438	548	160,378	
Selic-Alaska Canyon	East	88	56	100	0	18	33	30		4,119
	West	53	17	90	0	338	11	38		4,660
	TOTAL	141	73	190	0	356	44	68	8,779	

TABLE F-1
ACREAGES OF HABITAT TYPE BY ALLOTMENT (continued)

		Habitat Type HT -							SYSTEMATIC AREA	
Allotment	Pasture	26	27	28	Bad-lands	Rubble land	Rock out-crop	Misc.	Allot-ment Total	Pasture Total
Bare	Hog Mountain	0	250	0	3,558	2,717	496	0		40,636
	Fox Mountain	0	270	0	327	3,742	685	0		39,478
	Clover Creek	0	541	0	3,243	1,693	1,223	0		65,423
	Duck Flat	0	0	0	1,178	850	263	75		24,909
	Hoover	0	0	0	212	423	110	125		10,387
	Old Camp	0	0	0	3,495	750	250	10		20,895
	TOTAL	0	1,061	0	12,013	10,175	3,027	210	201,728	
Wall Canyon	Seeding	0	0	0	0	0	58	0		3,154
	East	0	0	0	216	299	376	50		14,964
	West	0	17	0	155	2,249	381	125		19,216
	TOTAL	0	17	0	371	2,548	815	175	37,334	
Red Rock		0	0	0	0	2	3	270	1,668	
Cold Springs		0	6	0	0	3	3	0	220	
Cedar		0	0	0	0	0	0	0	160	
Boot Lake		0	0	0	0	0	0	10	400	
State Line		0	0	0	0	0	0	0	140	
Clarks Valley		0	0	0	0	0	0	0	30	
Corral		0	77	0	0	58	12	0	1,560	
Highway		0	0	0	0	0	0	14	1,360	
	TOTAL	834	2,953	610	24,689	45,302	10,746	1,531	675,509	

climax) was determined using standard Soil Conservation Service (SCS) procedures (U.S. Dept. Ag., SCS, 1976) and appropriate SCS range condition guides for the habitat types defined as range sites by Summerfield and Bagley (1974). Although site potential is defined by the SCS in terms of species composition by weight, species composition by canopy cover should provide a reasonable approximation for the purpose of placing a habitat type into such general classifications as poor (0-25% of climax), fair (26-50% of climax), good (51-75% of climax), or excellent (76-100% of climax) condition. Both parameters are measurements of dominance (Daubenmire, 1968; Whittaker, 1970; Oosting, 1956) and both parameters show similar relative differences in species dominance or importance (Whittaker, 1965). Although condition classes and estimated livestock forage production are computed from this data, production estimates are not used to compute livestock or wildlife carrying capacities. Livestock forage production has a broad range of values that fluctuate with growing conditions and it is provided to show an approximation of what presently exists compared to what could exist. Canopy cover, frequency, and species composition data obtained during the inventory provide a permanent data base which can be monitored to determine vegetative trends and responses and to allow management decisions or adjustments to be made.

Condition of the other four habitat types was judged according to a variety of other sources. Each stand was evaluated separately.

Condition ratings based on the SCS procedure provided evaluations for 85 percent of the land area of the two planning units and, therefore, provided a common basis for comparison of average condition of allotments. Condition ratings of each stand were arranged by allotment, and differences in mean condition (TABLE F-3) were tested in a completely randomized analysis of variance design (Steel and Torrie, 1960). No significant differences in mean condition were indicated (the probability of no difference was greater than 0.50). Thus, no allotment can be singled out as being in any better or worse condition than any other allotment. The average condition of all allotments is "fair".

Differences in mean condition of habitat types (TABLE F-4) and mean number of cattle fecal piles (TABLE F-5) were similarly tested in a completely randomized analysis of variance design. Highly significant ($\Sigma=0.001$) differences were indicated. Duncan's new multiple range test (Steel and Torrie, 1960) was used to determine where significant differences ($\Sigma=.05$) existed. Although there was broad overlap in the mean condition ranges, the results generally lend credibility to the distinction between "poor," "fair," and "excellent" condition classes. The habitat types in poor condition (greasewood/saltgrass and big sagesilver sage/Great Basin wildrye) were significantly different from the others. The low sage/bluegrass-squirreltail habitat type was in "excellent" condition, and its mean was significantly greater than all others. The two habitat types in "good" condition did not differ significantly from most of those in "fair" condition. Thus, the distinction between "fair" and "good" is questionable.

Occurrence of cattle fecal piles indicated that the aspen and Nevada bluegrass-sedge habitat types were more greatly used than all other habitat types except curlleaf mountain mahogany big sage Idaho fescue and willow/Nevada bluegrass (fecal piles were not counted in the willow/Nevada bluegrass type). The curlleaf mountain mahogany/big sage/Idaho fescue type had fewer cattle fecal piles than the aspen communities but more than all other habitat types except Nevada bluegrass-sedge and big sage-silver sage/Great Basin wildrye.

Condition of the aspen habitat type was evaluated by Houston's (1954) condition guide, supplemented with condition criteria from USDA, Forest Service (1970), Hutchins (1965), and Beetle (1974). Of the seven stands sampled on public land, four were judged to be in "poor" and three in "very poor" condition by Houston's guide. Absence of successful aspen reproduction due to unsystematic grazing is characteristic of all these stands. Although climax aspen understory is extremely variable from site to site, it is characterized by a predominance of tall perennial forbs and a lesser amount of tall perennial grasses (Houston, 1954; USDA, Forest Service, 1970; Hutchins, 1965; Beetle, 1974). This was not the existing situation in the Tuledad/Home Camp Study Area. Total canopy coverage averaged about 20 percent for the seven stands; only about 6 percent was forbs and 10 percent grasses. Half (3 percent cover and 6 of 11 species) of the forbs have been described as increasers under livestock

TABLE F-2
ACREAGE OF HABITAT TYPES EXCLUDED FROM GRAZING

HABITAT TYPE HT -

Area	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	Bad Lands	Rubble Lands	Rock Outcrop	Miscellaneous	Total Acres
Garden Lake	32		24												32		96						456										640
Grass Lake			15																	100	30		255										400
Red Rock Lake																																160	160
Snake Lake	7		13												8		15					10	247										300
Bare Creek	47					15	108								48		142										25			15			400
Barber Creek							15																				5						20
Cottonwood Creek							133																		7		20						160
Selic Creek																			2								3						5
Alaska Creek																										2	3						5
Emerson Creek							271											7	13								10			137	7	15	460
Aspen Stand							15																		5	20							40
Meadows	5						25						10		5		15																60
Springs													38																				38
Reservoirs							7						1				4			2													14
Bicondoa		507		3906			559	3		651	1695				168			849											86	2208	181	32	10845
Lower Lake		233		20						156																			3402			1082	4893
North Tuledad							60											15				135								270			480
TOTAL	91	740	52	3926		15	1193	3		807	1695		49		261		272	871	15	102	30	145	958		12	22	66		3488	2630	188	1289	18920

TABLE F-3
MEAN RANGE CONDITION OF ALLOTMENTS

No statistically significant differences between means exist ($p > 0.50$). n = number of stands sampled. Condition ratings used were for only those habitat types described as range sites by Summerfield and Bagley (1974).

Allotment	Mean Range Condition (% of climax)	Sample Size n
Lower Lake	26.5	4
Selic-Alaska Canyon	32.7	3
Bicondoa	35.4	5
Tuledad	37.7	27
Duck Lake	39.0	5
Home Camp	41.6	27
Wall Canyon	42.8	6
Bare	45.9	27
Denio	47.7	3

TABLE F-4

Condition classes and mean percentage of climax composition of habitat types described as range sites by Summerfield and Bagley (1974). Means underscored by the same line are not significantly different (α = 0.05).

P = poor, F = fair, G = good, E = Excellent, n = number of stands sampled.

Habitat Type No. HT-	10	9	1	2	18	19	20	13	11	4	24	5	12	7	15	14	17	6	16	3	21
Condition Class	P	P	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F*	F*	E
Sample Size n	3	2	4	6	4	4	8	11	5	3	3	8	6	6	5	4	6	7	3	3	5
Mean Percentage of Climax Composition	7.3	22.0	29.8	31.8	32.5	34.3	34.4	35.7	36.6	37.7	40.7	40.8	41.7	42.6	44.0	45.5	46.5	49.4	52.3	58.3	80.2

*Although the mean percentage of climax composition of habitat types HT-16 and HT-3 was greater than 50 percent, a condition class of "fair" has been assigned, because the means are not significantly different from most of the others in "fair" condition.

TABLE F-5

Mean number of cattle fecal piles per 0.1 hectare in habitat types.

Fecal groups were not counted in the willow/Nevada bluegrass type. Means underscored by the same line are not significantly different ($\alpha = 0.05$).

Habitat Type HT-	12	28	11	4	3	19	6	10	18	17	14	21	5	1	2	20	16	15	7	23	9	25	13	26
Mean no. fecal piles/0.1 ha	0.0	3.3	6.6	8.8	13.1	19.7	20.6	26.3	26.3	28.4	32.8	32.8	35.3	36.1	37.7	39.4	48.1	57.8	60.2	88.6	91.9	116.7	443.6	602.5

grazing pressure (Hutchins, 1965; Beetle, 1974)—*Chenopodium* spp., *Stellaria jamesiana*, *Gayophytum* spp., *Galium* spp., *Taraxacum officinale*, and *Polygonum douglassii*.

The average cover of about 10 percent for grasses greatly reflects the influence of stand No. 7, where *Elymus glaucus* (blue wildrye) had a canopy coverage of 24 percent and the total grass cover was 37 percent. Although blue wildrye is classified as a decreaser under livestock grazing pressure by both Hutchins and Beetle, this area (in Alaska Canyon) receives predominantly sheep use and very light cattle use (as was indicated by the pellet group counts, 47 sheep; 6 cattle). Severson (1963) found that sheep use tended to result in a grass dominated understory, while cattle use resulted in a forb dominated understory. No forbs occurred in the sampling of stand No. 7.

A paucity of ecological information on willow dominated riparian habitat hinders interpretation of the present condition of the Willow/Nevada bluegrass type. Although it originally occurred scattered throughout the Tuledad/Home Camp Study Area, predominately on Welch silty clay loam soils (Summerfield and Bagley, 1974), on public lands it is presently limited to only a few remaining areas, principally Selic Canyon, Alaska Canyon, Barber Creek, Bare Creek, and Cottonwood Creek. Since sampling was restricted to these remaining vegetative communities, the description of the willow/Nevada bluegrass habitat type is not representative of the situation existing on the soil-climate complex of this habitat type throughout the planning units. It is thus unfair to assign a condition rating per se to this habitat type.

The understory vegetation (shrubs, grasses, forbs) of the stands sampled was rated using the SCS condition guide for the Nevada bluegrass-sedge habitat type. (For a discussion of the synecological relationships between the willow/Nevada bluegrass and the bluegrass-sedge habitat types, refer to Chapter 2.) Four of the five stands were in "fair" condition, and one was in "good" condition. Despite the availability of water, shrubs and junipers have invaded (about 23 percent canopy cover for the average of all five stands), and an average of 25 percent of the ground surface is bare.

Although no data were collected to quantify such relationships, field observations showed most of the willow/Nevada bluegrass habitat type to exist in various stages of severe disturbance. The retrogression appears to proceed from the willow/Nevada bluegrass community through a silver sage-big sage/sedge community to a big sage disclimax (with little or no understory).

Condition of the baltic rush habitat type could not be evaluated with the SCS range condition guides, even though this habitat type has been described as a range site by Summerfield and Bagley (1974). This habitat type occurs in clay basins which are inundated in the spring. Much of the vegetation consists of annuals, and according to the SCS range site description, "the amount and species composition of the forage produced will vary widely from year to year depending upon the length of inundation." The only shrub that occurred in the stands sampled was silver sage, present in two of the communities. At SOB Lake (Tuledad Allotment) silver sage was present around the margins of the baltic rush community. Grass Lake (Home Camp Allotment), however, has been invaded by silver sage (canopy cover of 11.4 percent) throughout the community. Many of these shrubs are young plants and seedlings. No silver sage occurred in the other two stands, and observations of the baltic rush habitat type throughout the planning units indicated very little shrub invasion. In 1976, the communities were dominated by baltic rush and evening primrose.

No condition guides or detailed description of the climax association could be found for the white fir habitat type. The overstory was dense and dominated by white fir. An even age distribution of trees existed in all stands sampled, ample evidence of successful regeneration of the climax forest. The understory was sparse, totaling only about 5 percent vegetative cover, of which about half was grass. Pellet group counts indicated that this habitat type is used mostly by deer (probably for cover) and only very lightly by cattle (total of 1 cow and 41 deer pellet groups).

Curlleaf mountain mahogany ecology has received little scientific investigation, but the work of Dealy (1975) provides some insight into the climax vegetation of this habitat type. Dealy described 12 curlleaf mountain mahogany associations occurring in Oregon, northern California, and northern Nevada. His *Cercocarpus ledifolius/Artemesia tridentata/Festuca idahoensis* association appears to describe the curlleaf mountain mahogany habitat type of the Tuledad/Home Camp Planning Units. Big sage occurred in the understory of all but one of the stands sampled and was by far the dominant shrub. Although Idaho fescue occurred in only one stand, it clearly dominated the herbaceous understory of that stand (30 percent canopy cover in a 44 percent total canopy cover). Pellet group counts indicated that this stand (located on Mahogany Mountain in Denio Allotment) receives light cattle use and heavy deer use (4 cattle versus 30 deer pellet groups).

Squirreltail and bluegrass dominated herbaceous understory of the other stands has probably resulted from unsystematic cattle grazing of these communities. Dealy described a *Poa sandbergii* successional stage of the *Cercocarpus ledifolius/Artemesia tridentata/ Festuca idahoensis* association, in which he believed that the dominance of bluegrass over the fescue was due to livestock grazing. Bluegrass matures earlier than Idaho fescue, and thus later summer grazing would leave the fescue with a competitive disadvantage.

The present understory of the curlleaf mountain mahogany habitat type is therefore a reflection of past grazing use and the influence of the adjacent big sage/Idaho fescue habitat type, which occurs with the urlleaf mountain mahogany communities throughout the planning units. Form class data indicated an "unsatisfactory" condition of all six stands sampled, but this condition is based only on the availability of browse to ungulates and does not represent any relationship to site potential. The criterion for differentiating between "satisfactory" or "unsatisfactory" condition is whether or not more than 15 percent of the individuals existed in a heavily hedged or unavailable condition.

The condition data (again referring to the availability of browse to ungulates) from the bitterbrush and curlleaf mountain mahogany browse ranges (TABLES F-6, F-8) was tested for statistical significance with the binomial test (Zar, 1974). Home Camp, Bare, Tuledad, and Selic-Alaska Canyon Allotments appeared to be in unsatisfactory condition. Bare and Tuledad were the only allotments that showed a statistically significant ($p = 0.95$) probability of being in unsatisfactory condition. Denio was the only allotment appearing to have browse ranges in satisfactory condition, but the reliability of such an assessment is questionable ($p = 0.69$).

RANGE TREND

Range trend data from the Parker-3-step transects (TABLE F-12) and the 5 ft. x 5 ft. stereo photo plots (TABLE F-13) were summarized by allotment (TABLE F-14). Statistical reliability of the apparent trend of each allotment was determined by the Kolmogorov-Smirnov test for goodness of fit (Zar, 1974). Reliability of the Parker-3-step data was too low to lend any credibility to the apparent trends of the Tuledad, Denio, Wall Canyon, and Bare Allotments. The apparent upward trend in the Home Camp Allotment is questionable ($0.80>p>0.50$). The insignificance of the data is partially due to the very small sample sizes when the trends are tested on an allotment by allotment basis. With all the Parker-3-step data pooled, an upward trend is indicated ($0.90>p>0.80$) but not significantly ($L = .05$) so.

Stereo photo plots were located only in the Wall Canyon and Bare Allotments and tended to show a downward trend. The apparent trend of the Wall Canyon Allotment, however, is not reliable ($p<0.50$). That for the Bare Allotment is stronger, but still questionable ($0.90>p>0.80$). In any event, interpretation of the stereo photo plot trend data is complicated by the fact that no differentiation is made between shrub cover and herbaceous cover. Thus a decrease in sagebrush canopy cover without at least a corresponding increase in herbaceous cover will indicate a downward trend (this was the case in several of the Bare Ranch photo plots). This is further complicated by lack of differentiation between annual and perennial species. Apparent trend can thus fluctuate greatly from year to year as a function of precipitation. Two stereo photo plots were located in the Wall Canyon Allotment's crested wheatgrass seeding shortly after its establishment. A downward trend would be expected in these plots, irrespective of grazing intensities, since grass seedings usually do best immediately following establishment, then regress to a productive state more commensurate with the productive capacity of the site. Considering the complications involved in the interpretation and reliability of the stereo photo plot data, their value is certainly questionable and any conclusions highly suspect.

Sample sizes were not sufficiently large to test the significance of trend by habitat type for either the Parker-3-step data or the stereo photo plot data.

TABLE F-6

Condition of antelope bitterbrush - mountain mahogany browse ranges by allotment. Probability of trend was determined by the binomial test distribution.

S = satisfactory condition

U = unsatisfactory condition

Allotment	U	S	Condition U or S	Probability (U or S)
Home Camp	5	1	U	0.891
Bare	6	0	U	0.984
Denio	1	3	S	0.687
Tuledad	11	3	U	0.971
Selic-Alaska Canyon	2	0	U	0.750
Total for Home Camp, Denio, Selic-Alaska Canyon	8	3	U	0.887

TABLE F-7

Apparent trend of antelope bitterbrush - mountain mahogany browse ranges by allotment. Probability of apparent trend was determined by the KologorovSmirnov test for goodness of fit. Probability expressed is 1-p (null hypothesis, i.e., no trend).

Allotment	Apparent Trend	Probability of Apparent Trend	Sample Size
Home Camp	down	$0.80 > p > 0.50$	6
Bare Ranch	up	$p < 0.50$	6
Denio	up	$0.80 > p > 0.50$	4
Tuledad	down	$p < 0.50$	14
Bare Creek*	up	$0.80 > p > 0.50$	(8)
Cottonwood*	down	$0.90 > p > 0.80$	(5)
Coppersmith*	down	$p < 0.50$	(1)
Selic-Alaska Canyon	down	$0.80 > p > 0.50$	2
Total of all Transects	down	$0.80 > p > 0.50$	32

*Bare Creek, Cottonwood, and Coppersmith pastures of Tuledad Allotment.

TABLE F-8

Condition of antelope bitterbrush browse ranges by allotment. Only transects with 20 or more bitterbrush individuals sampled have been used. Probability of condition was determined with the binomial distribution.

S = satisfactory condition

U = unsatisfactory condition

Allotment	U	S	Condition U or S	Probability U or S
Home Camp	4	0	U	0.938
Bare	2	0	U	0.750
Denio	0	2	S	0.750
Tuledad	9	0	U	0.998
Total of all Transects	15	2	U	0.999
Total of all but Tuledad	6	2	U	0.891

TABLE F-9

Apparent trend of antelope bitterbrush browse ranges by allotment. Only transects with 20 or more bitterbrush individuals sampled have been used. Probability of apparent trend was determined by the Kolmogorov-Smirnov test for goodness of fit. Probability expressed is 1 - p(null hypothesis, i.e., no trend).

Allotment	Apparent Trend	Probability of Apparent Trend	Sample Size
Home Camp	down	$0.98 > p > 0.95$	4
Bare	down	$p < 0.50$	2
Denio	static[2]	$p < 0.50$	2
Tuledad	down	$0.80 > p > 0.50$	9
Bare Creek[1]	static[2]	$p < 0.50$	(5)
Cottonwood[1]	down	$0.95 > p > 0.90$	(3)
Coppersmith[1]	down	$p < 0.50$	(1)
Total of all Transects	down	$0.99 > p > 0.98$	17
Total of all but Home Camp	down	$0.80 > p > 0.50$	13

1/ Bare Creek, Cottonwood, and Coppersmith pastures of Tuledad Allotment.

2/ Trend appears equally up or down. Probability expressed is the probability of the null hypothesis (i.e., no trend).

TABLE F-10

Condition of curl-leaf mountain mahogany browse ranges by allotment. Only transects with 20 or more mahogany individuals sampled have been used. Probability of condition was determined by the binomial distribution.

S = satisfactory condition

U = unsatisfactory condition

Allotment	U	S	Condition U or S	Probability (U or S)
Home Camp	1	0	U	0.500
Bare	1	0	U	0.500
Denio	0	1	S	0.500
Total for all Transects	2	1	U	0.625

TABLE F-11

Apparent trend of curl-leaf mountain mahogany browse ranges by allotment. Only transects with 20 or more mahogany individuals sampled have been used. Probability of apparent trend was determined by the Kolmogorov-Smirnov test for goodness of fit. Probability expressed is 1 - p(null hypothesis, i.e., no trend).

Allotment	Apparent Trend	Probability of Apparent Trend	Sample Size
Home Camp	up	$p < 0.50$	1
Bare	up	$p < 0.50$	1
Denio	up	$p < 0.50$	1
Tuledad	up	$p < 0.50$	3
Bare Creek*	up	$0.80 > p > 0.50$	(2)
Cottonwood*	static	$p < 0.50$	(1)
Total for all Transects	up	$0.95 > p > 0.90$	6

*Bare Creek and Cottonwood pastures of Tuledad Allotment.

TABLE F-12

Parker-3-step condition trend data by allotment, pasture, and habitat type.

Soil and vegetation condition rating symbols are:

VP = very poor, P = poor, F = fair.

Trend was determined by changes in vegetative condition score (e.g., fair to poor).

Allotment	Pasture	Habitat Type	Annuals1/ 1958	Annuals1/ 1976	Perennials1/ 1958	Perennials1/ 1976	Litter1/ 1958	Litter1/ 1976	Rock1/ 1958	Rock1/ 1976	Erosion Private1/ 1958	Erosion Private1/ 1976
Tuledad	Coopersmith	HT-15	31	7	23	20	18	20	.5	1	26	51
	Cottonwood	HT-15	3	0	38	39	41	34	4	3	13	23
			1960	1976	1960	1976	1960	1976	1960	1976	1960	1976
Denio	East	HT- 7	7	0	30	35	18	19	3	.6	46	45
	South	HT- 6	3	0	17	29	13	13	2	0	65	58
	East	HT- 7	3	0	33	40	3	10	3	2	59	17
			1961	1976	1961	1976	1961	1976	1961	1976	1961	1976
Wall Canyon	East	HT-20	.3	0	14	28	16	13	2	0	67	59
Bare	Clover Creek	HT- 7	0	0	19	26	24	24	.7	0	56	50
	Fox Mountain	HT- 7	8	1	32	51	14	16	7	4	39	28
	Old Camp	HT- 6	1	3	9	21	22	19	3	3	65	55
Home Camp	Grass Lake	HT-18	1	2	39	43	20	10	13	13	24	23
	Hart Camp	HT-20	0	0	21	26	16	17	21	20	41	31
	Hart Camp	HT-17	2	3	25	30	30	21	19	22	24	24
	Hart Camp	HT-20	2	0	20	31	26	22	31	.3	21	46
	Hays Canyon	HT- 7	0	.3	32	40	37	32	5	5	26	23
	Grass Lake	Ht- 7	1	0	22	36	32	24	13	11	33	29

1/ Numbers indicate the average number of hits per 100-point transect.

TABLE F-12 (Continued)

Allotment	Pasture	Soil Condition Rating 1958	Soil Condition Rating 1976	Overstory1/ 1958	Overstory1/ 1976	Understory1/ 1958	Understory1/ 1976	Desirable Plant Index 1958	Desirable Plant Index 1976	Total Primary and Secondary spp. 1958	Total Primary and Secondary spp. 1976	Vegetative Condition Score 1958	Vegetative Condition Score 1976	Trend
Tuledad	Coppersmith	21 F	8 P	23	19	31	8	0	.5	.5	1	10 P	7VP	Down
	Cottonwood	24 F	15 P	28	30	13	10	8	6	8	7	20 F	10 F	Static
		1960	1976	1960	1976	1960	1976	1960	1976	1960	1976	1960	1976	
Denio	East	9 P	9 P	27	28	8	10	1	4	6	8	8VP	17 F	Up
	South	9 P	6VP	16	28	5	2	0	0	.3	.5	4VP	2VP	Static
	East	10 P	11 P	29	22	7	18	0	1	4	15	11 P	26 F	Up
		1961	1976	1961	1976	1961	1976	1961	1976	1961	1976	1961	1976	
Wall Canyon	East	11 P	8VP	12	21	3	7	2	4	2	6	6VP	15 P	Up
Bare	Clover Creek	7 P	8 P	15	21	4	5	2	3	4	5	10 P	13 P	Static
	Fox Mountain	19 F	16 P	27	43	14	9	1	6	3	7	12 P	18 F	Up
	Old Camp	6VP	14 P	9	19	3	6	0	.7	.3	2	2VP	6VP	Static
Home Camp	Grass Lake	18 F	15 P	35	37	4	8	.3	1	2	6	7VP	15 P	Up
	Hart Camp	16 P	17 F	19	19	3	13	1	5	1	7	4VP	16 F	Up
	Hart Camp	19 F	15 P	20	17	6	15	13	0	4	11	11 P	22 F	Up
	Hart Camp	17 F	13 P	8	18	11	13	3	6	9	12	20 F	23 F	Static
	Hays Canyon	14 P	15 F	26	31	5	9	1	1	4	4	10 P	13 P	Static
	Grass Lake	17 F	11 P	14	26	8	9	3	3	6	9	16 F	19 F	Static

1/ Numbers indicate the average number of hits per 100-point transect.

TABLE F-13
5' X 5' STEREO PHOTO PLOT TREND DATA BY ALLOTMENT, PASTURE, AND HABITAT TYPE

			Trend Index Summary											
Allot-ment	Pasture	Habitat Type	Key Species Composition (%)		Cover, Live Vegetation (%)		Seedlings, Key Species (Number)		Litter, Plot Total (%)		Total		% Change	Trend
			1972	1976	1972	1976	1972	1976	1972	1976	1972	1976		
Wall Canyon	West	HT-17	5.0	9.2	17.0	21.7	0.0	0.0	1.2	1.8	23.2	32.7	+41	Up
	West	HT-17	5.8	4.0	10.9	12.0	0.0	0.0	.5	.3	17.2	16.3	- 5	Static
	Seeding		82.5	80.9	10.6	9.6	0.0	0.0	3.7	4.76	101.8	95.3	- 8	Down
	Seeding		100.0	100.0	3.8	4.07	2.0	0.0	8.5	6.25	124.3	110.32	-14	Down
	East	HT-7	1.6	4.6	23.9	19.37	0.0	0.0	2.6	3.6	28.1	27.57	- 2	Static
	East	HT-9	1.1	4.5	28.0	25.26	1.0	0.0	0.0	1.16	30.1	30.9	+ 3	Static
			1970	1976	1970	1976	1970	1976	1970	1976	1970	1976		
Bare	Clover Creek	HT-7	62.7	51.0	16.1	27.42	0.0	0.0	6.5	.48	85.3	78.9	- 8	Down
	Clover Creek	HT-7	51.8	45.67	46.4	52.59	0.0	0.0	1.2	.99	99.4	99.25	- 1	Static
	Old Camp	HT-5	0.0	0.0	3.97	11.32	0.0	0.0	19.41	2.13	23.38	13.45	-13	Down
	Old Camp	HT-20	10.26	.17	17.19	12.78	0.0	0.0	0.72	.96	28.17	13.91	-51	Up
	Duck Flat	HT-12	0.0	1.5	53.31	51.59	0.0	0.0	.42	0.0	53.73	53.09	- 1	Static
	Duck Flat	HT-12	8.0	3.18	7.0	6.6	0.0	0.0	4.0	3.24	19.0	13.02	-31	Static
	Fox Mountain	HT-7	2.15	7.06	25.79	25.92	0.0	0.0	6.51	1.2	34.45	34.18	- 1	Static
	Fox Mountain	HT-7	3.0	19.18	51.0	23.76	6.0	0.0	10.0	1.89	70.0	44.83	-36	Down
			1974	1976	1974	1976	1974	1976	1974	1976	1974	1976		
	Hog Mountain	HT-6	0.0	.3	13.36	11.5	0.0	3.0	8.0	3.93	21.36	18.68	-13	Down
	Hog Mountain	HT-6	50.3	62.61	18.0	10.19	48.0	0.0	1.0	1.56	117.3	74.36	-37	Down
	Clover Creek	HT-5	15.9	2.69	23.0	14.06	0.0	0.0	1.0	.63	39.9	17.38	-54	Down

TABLE F-14

Range trend by allotment, determined by Parker-3-Step transects and stereo photo plots. Probability of trend was determined by the Kolmogorov-Smirnov test for goodness of fit. Probability expressed is 1 - p(null hypothesis, i.e., no trend).

N = number of stands sampled.

Parker-3-Step-Data

Allotment	Trend	Probability of Trend	Sample Size N
Tuledad	down	$p < 0.50$	2
Denio	up	$p < 0.50$	3
Wall Canyon	up	$p < 0.50$	1
Bare Ranch	up	$p < 0.50$	4
Home Camp	up	$0.80 > p > 0.50$	6
All Data Pooled	up	$0.90 > p > 0.80$	16

Stereo-Photo-Plot Data

Allotment	Trend	Probability of Trend	Sample Size N
Wall Canyon	down	$p < 0.50$	6
Bare	down	$0.90 > p > 0.80$	11
All Data Pooled	down	$0.90 > p > 0.80$	17

The apparent shrub trends, indicated by the form and age classes tallied for all shrubs measured in the line intercept sampling of the habitat types described as range sites by Summerfield and Bagley (1974), were summarized by allotment (TABLE F-15) and tested for statistical significance with the Kolmogorov-Smirnov test for goodness of fit. The data indicated a general upward trend. Home Camp Allotment's apparent shrub trend was highly significantly ($p>0.999$) upward but no significant trends ($\Sigma=.05$) were indicated for any other allotments. However, when the data for the other allotments were pooled, their apparent shrub trend was significantly ($0.99>p>0.98$) upward. Thus the apparent shrub trend data, analysed on an allotment by allotment basis, showed a definite upward trend in only the Home Camp Allotment; trends were weak in all other allotments, but when considered together, a general upward trend was indicated.

Heterogeneity chi-square analysis (Zar, 1974) demonstrated that the Parker-3-step, stereo photo plots, and apparent shrub trend data could not be pooled (neither together, nor in any combination of two). Each type of trend data must be considered independently.

The sample size of the apparent shrub trend data was sufficiently large to summarize by habitat type and test for significant trends (TABLE F-16). Of the 20 habitat types analysed, statistically significant ($\Sigma=.05$) trends were indicated in only four. The shadscale-big sage habitat type exhibited a downward trend. The big sage/Great Basin wildrye, the big sage/bluebunch wheatgrass, and the low sage/Idaho fescue habitat types exhibited upward trends. The silver sage/Nevada bluegrass habitat type came very close to showing a statistically significant ($\Sigma=.05$) upward trend, but had a sample size of only three stands. The data do not sufficiently demonstrate the existence of any apparent trends in the other habitat types for which apparent shrub-trend data were available. When the data for the types with nonsignificant ($\Sigma=.10$), thus excluding the silver sage/Nevada bluegrass habitat type from the pooled data) trends were pooled, however, a significantly ($\Sigma=.05$) upward trend was indicated.

Analysis of the apparent shrub trend data therefore demonstrated that the Home Camp Allotment, and the big sage/Great Basin wildrye, big sage/bluebunch wheatgrass, and low sage/Idaho fescue habitat types exhibited upward trends and the shadscale-big sage habitat type exhibited a downward trend. Trends could not be identified for the other allotments and habitat types when considered on an individual basis, but a general upward trend in range condition was indicated. As previously stated, however, the value of apparent shrub trend data is questionable since they represent conditions measured at only one point in time.

No quantitative trend data were collected for the Nevada/bluegrass-sedge habitat type, but field observations indicated a downward trend. Shrubs, particularly big sage, silver sage, and rabbitbrush have invaded most meadows and appear to be increasing. Active head-cuts were present in eight of the 13 meadows sampled. Thus a downward trend existed in at least that many stands. If eight downward trends, five static, and no upward trends are assumed, the Kolmogorov-Smirnov test indicates a downward trend very close to being significant ($0.95>p>0.90$).

The aspen habitat type is definitely in a downward trend. The frequency distribution of tree diameter size classes demonstrates the absence of successful regeneration of aspen, characteristic of the aspen habitat type throughout the Tuledad/Home Camp Study Area. Despite vigorous root sprouting (the average for the seven stands sampled was 5,864 sprouts per acre), young trees were present in only one stand. As older trees eventually die without replacement, the overstory canopy opens up. Beetle (1974) believes the resulting increase in sunlight and microclimatic change at the stand floor allows for the persistence of sun-loving plants only and results in the invasion of plants characteristic of adjacent communities with the eventual elimination of aspen.

No quantitative trend data were collected for the willow/Nevada bluegrass habitat type. This association has been severely reduced in extent during past years. As described earlier, much of the soil-climate complex potential of supporting the willow/Nevada bluegrass association now supports silver sage-big sage/sedge communities or a big sage disclimax. Field observations indicated that the trend is presently downward. The habitat type serves as concentration areas for cattle and is subjected to intense grazing pressures, since it provides permanent water and green forage throughout the grazing season and is usually the major natural trailing route for cattle movements.

TABLE F-15

Apparent trend of allotments, determined by shrub form and age classes. Probability was determined by the Kolmogorov-Smirnov test for goodness of fit. Probability expressed is 1 - p(null hypothesis, i.e., no trend).

n = number of stands sampled.

Allotment	Apparent Trend	Probability of Trend	Sample Size n
Home Camp	up	$p > 0.999$	17
Bare	up	$p < 0.50$	18
Denio	Static*	$p > 0.50$	2
Tuledad	up	$0.80 > p > 0.50$	20
Selic-Alaska Canyon	Static*	$p > 0.50$	4
Duck Lake	up	$p < 0.50$	6
Lower Lake	up	$0.80 > p > 0.50$	4
Wall Canyon	up	$0.80 > p > 0.50$	7
Bicondoa	down	$0 < 0.50$	5
Total (Excluding Home Camp)	up	$0.99 > p > 0.98$	66

Although willows sprouted vigorously in 1976, the sprouts were eaten right to the ground level. Willow regeneration is, therefore, a problem and the relatively high percentage (about 25 percent) of bare ground is conducive to unpalatable shrub establishment and accelerated soil erosion.

The baltic rush habitat type occurs in enclosed clay basins where soil erosion is not a problem. Periodic, usually annual, inundation creates conditions intolerable for shrub invasion. The dominant plants are baltic rush (which is very resistant to grazing) and annuals. This combination of factors, therefore, creates a habitat type very resistant to grazing pressures. No trend data were collected for this habitat type, and field observations gave no indications of trend (other than static) except in Grass Lake (Home Camp Allotment) where silver sage was increasing. The trend for the habitat type is probably static.

Frequency distributions of tree diameters in the white fir habitat type indicated a static trend. A thick layer of duff covered the forest floor, and observations on understory vegetation gave no indications of a trend other than static.

Trend of the curlleaf mountain mahogany habitat type is more difficult to assess. Frequency distributions of tree diameters demonstrate ample seedling establishment (an average of 1,505 seedlings per acre) but very little or no successful reproduction. Three of the stands (numbers 2, 3, and 4) sampled in August were revisited in December and showed 86 percent, 96 percent, and 94 percent reductions in the number of seedlings surviving. Poor regeneration of mountain mahogany under its own canopy should probably be expected, however. Dealy (1975) found poor regeneration in the duff under the mountain mahogany stands he examined, and believed it was due to intense intraspecific competition coupled with insect damage. Rodents and deer may also be responsible for much of the seedling mortality (Scheldt, 1969). Dealy found that reproduction was much more successful on mineral soil in openings within the mahogany communities and along the community periphery. Field observations in the Tuledad/Home Camp Study Area indicated similar relationships in reproductive success. The established young individuals were heavily hedged, though, and were restricted to places where protection is afforded—bases of shrubs, crevices in rock piles, etc.

This may indicate that the trend of the curlleaf mountain mahogany habitat type is downward; but mountain mahogany is a long-lived species (400-600 years according to Dealy), and successful reproduction year after year is not necessary for the species' successful long-term regeneration. Trend was not indicated by the understory vegetation data.

Bitterbrush and mountain mahogany browse range transects (TABLE F-11) indicated no overall trend for the planning units as a whole. The apparent trends indicated for individual allotments were weak when tested with the Kolmogorov-Smirnov test for goodness of fit (Zar, 1974). The transects showing the strongest apparent trend were in the Cottonwood pasture of the Tuledad Allotment; they indicated a downward trend, but such a conclusion is questionable (0.90 p 0.80). However, when bitterbrush and mountain mahogany were analyzed separately (TABLES F-9, F-7 respectively), much stronger trends were indicated. Downward apparent trends in bitterbrush were most evident in the Home Camp Allotment and the Cottonwood pasture of the Tuledad Allotment. Small sample sizes complicated the analysis of individual allotments, but a general downward trend was indicated. The apparent upward trends in mountain mahogany resulted from the abundance of mahogany seedlings of the current year. Since the success of such seedlings appears to be very low, the credibility of the mountain mahogany browse range apparent trend data is correspondingly very low.

Conclusions

The data indicated several conclusions which can be briefly summarized as follows:

(1) No significant differences were demonstrated to exist in the average condition of allotments. No one allotment could be singled out as being in any better or worse condition than another. All allotments had an average condition of "fair."

(2) Highly significant differences were demonstrated in the average conditions of habitat types described as range sites by Summerfield and Bagley (1974), and these differences lend credibility to the distinctions between "poor," "fair," and "excellent" condition classes. The greasewood/saltgrass and big sage-silver sage/Great Basin wildrye habitat types were in

TABLE F-16

Apparent trend of habitat types described as range sites by Summerfield and Bagley (1974), determined by shrub form and age classes. Probability of trend was determined by the Kolmogorov-Smirnov test for goodness of fit. Probability expressed is 1 - p(null hypothesis, i.e., no trend). n = number of stands sampled.

Habitat Type	Apparent Trend	Probability of Trend	Sample Size n
HT-1	down	$p < 0.50$	4
HT-2	up	$p < 0.50$	4
HT-3	up	$0.95 > p > 0.90$	3
HT-4	down	$p < 0.50$	3
HT-5	up	$0.99 > p > 0.98$	8
HT-6	up	$0.80 > p > 0.50$	7
HT-7	up	$p < 0.50$	6
HT-9	Static*	$p > 0.50$	2
HT-10	up	$p < 0.50$	3
HT-11	down	$p > 0.50$	5
HT-12	down	$0.998 > p > 0.995$	6
HT-14	up	$p < 0.50$	3
HT-15	up	$p < 0.50$	4
HT-16	down	$p < 0.50$	3
HT-17	up	$0.98 > p > 0.95$	6
HT-18	up	$p < 0.50$	3
HT-19	up	$0.80 > p > 0.50$	4
HT-20	up	$0.99 > p > 0.98$	8
HT-21	up	$p < 0.50$	5
HT-24	down	$0.80 > p > 0.50$	2
Pooled for all habitat types (excluding HT 3, 12, 12, 17, 20)	up	$p > 0.999$	58

poor condition. The low sage/bluegrass-squirreltail habitat type was in excellent condition. The majority of the habitat types described as range sites were in fair condition.

(3) Range trend generally appeared to be upward. The Home Camp Allotment and the big sage/Great Basin wildrye, big sage/bluebunch wheatgrass, and low sage/Idaho fescue habitat types showed the strongest indication of upward trends. The shadscale-big sage and the Nevada bluegrass-sedge habitat types exhibited downward trends. No other allotment or habitat types identified as range sites by Summerfield and Bagley (1974) could be singled out as exhibiting definite trends. Taken all together, a general upward trend was indicated, but the evidence is not strong. Perhaps the single most valuable interpretation of the data is that a downward trend was not indicated for the majority of habitat types.

(4) The aspen habitat type is in poor condition with a downward trend. A forb depleted understory and failure of aspen regeneration are the most critical problems.

(5) The willow/Nevada bluegrass habitat type has been severely impacted by past grazing pressures. Only a few remnants of this association remain, and the trend of these is downward.

(6) The baltic rush habitat type is very resistant to grazing pressure. Species composition and productivity are related almost entirely to the length of time the community is inundated in the spring. Trend is probably static.

(7) The white fir habitat type receives only very light livestock use. It is probably in good to excellent condition with a static trend.

(8) Unsystematic livestock grazing has apparently lead to conversion of an Idaho fescue dominated herbaceous understory to a bluegrass and squirreltail dominated herbaceous understory in the curlleaf mountain mahogany habitat type. Mountain mahogany reproduction has been unsuccessful under its own canopy, but has been more successful in openings and along the periphery of the communities. The young plants are heavily hedged, but because mountain mahogany is especially long lived (400-600 years), short-term unsuccessful reproduction may have no effect on long- term regeneration.

(9) Bitterbrush and mountain mahogany browse ranges were generally in unsatisfactory condition in relation to degree of hedging and browse availability to ungulates. Bare and Tuledad Allotments stood out as definitely being in unsatisfactory condition. The data were not as conclusive for Home Camp and Selic-Alaska Canyon Allotments, but an unsatisfactory condition was indicated. The strongest trend exhibited was a downward trend in the Cottonwood pasture of Tuledad Allotment. However when bitterbrush was analyzed separately, a general downward trend was evident, with strongest evidence in the Home Camp Allotment and the Cottonwood pasture of the Tuledad Allotment.

(10) Most of the range of the Tuledad/Home Camp Study Area is in fair condition with a static or upward trend. Certain habitat types, however, are in downward trends. Though limited to only a very small portion of the total land area, the Nevada bluegrass-sedge, willow/ Nevada bluegrass, and aspen habitat types are some of the most valuable for wildlife and asthetics.

Appendix G

VISUAL RESOURCE MANAGEMENT

A four-step process is required to determine Visual Resource Management (VRM) Classes: the determination of scenic quality, visual sensitivity and visual prominence areas, and the combination of these factors on a three-Way matrix to obtain VRM Classes. Refer to the GLOSSARY for definitions of terms used in this VRM evaluation.

For the purpose of scenic quality evaluation, the study area was divided into nine rating areas: Alkali Lakes, Boulder Lake, Cottonwood Drainage, Cottonwood Mountains, Duck Flat, Fox-Hog Mountains, Hays Canyon Range, Long Valley and South Warners (MAP 2-14).

Within each rating area, the landscape features (landform, water, vegetation and man-introduced intrusions) and the overall aspects of color and uniqueness were evaluated. Numerical scores for each feature, when totalled, give the scenic quality class for each rating area (TABLE G-1).

The second step in the analysis is the visual sensitivity rating which requires the consideration of five criteria: highway and road-use volume, recreation- use volume, general social attitudes toward notable intrinsic resources, community land uses, and relationships and plans of other governmental agencies. Each of the criteria is rated as high, medium or low, then averaged with the relative importance of each considered. If a criterion is not present or important in the area, it may be left out entirely. Highway and road-use volume was the only criterion considered important in the study area.

Data for Modoc, Lassen and Washoe Counties (Modoc County, 1975; Lassen County, 1975; Westenhoefer, 1976) were utilized in order to rate roads within the study area for high, medium or low use. Only Modoc County Road 1 (north of Eagleville) has high use. Modoc 1 (south of Eagleville) and Nevada State Highways 81 and 34 have medium use. All other connecting and back roads have low use (MAP 2-18).

The third step is the identification of visual prominence zones: foreground-middleground, background, or areas seldom seen. Upon completion of this step, VRM Classes are determined by showing the scenic quality classes, visual sensitivity areas and visual prominence zones on a three-way matrix (TABLE G-2).

If scenery class and visual sensitivity ratings are placed in the matrix before visual prominence zones are determined, field analysis time can be saved. For example, all Class A scenery areas fall into VRM Class II, regardless of visual prominence zone. In addition, all Class C scenery areas in medium or low sensitivity areas are in VRM Class IV. Thus, for the purpose of this analysis, only Class B scenery areas in medium sensitivity areas required field review for determination of visual prominence zones.

By utilizing topographic maps and by driving medium use roads in both directions, it was determined that no foreground-middleground areas exist along such roads within Class B scenery areas. (No map was prepared for this step of the analysis.)

When the scenery evaluation, visual sensitivity and visual prominence areas are overlaid to determine areas with different ratings, VRM Classes result (MAP 2-15). Within the study area are VRM Class II lands (the South Warners) and VRM Class IV lands (the remainder of the area).

Visual Resource Management Classes provide guidelines or criteria for analysis of proposed management practices, project locations and design in order to provide the desired protection, rehabilitation or enhancement of the visual resources.

The following objectives for VRM Classes are stated in Bureau Manual 6300:

Class II. Changes in any of the basic elements (form, line, color texture) caused by a management activity should not be evident in the characteristic landscape.

Class IV. Changes may subordinate the original composition and character but must reflect what could be a natural occurrence within the characteristic landscape.

Class I, III, and V are not applicable in the study area.

TABLE G-1
QUALITY EVALUATION OF SCENERY IN THE STUDY AREA

Rating Area	Total Score	Class
Alkali Lakes	9	C
Boulder Lake	7	C
Cottonwood Drainage	9	C
Cottonwood Mountains	9	C
Duck Flat	6	C
Fox-Hog Mountains	13	B
Hays Canyon Range	12	B
Long Valley	6	C
South Warners	20	A

TABLE G-2
MATRIX CHART FOR DETERMINING VISUAL RESOURCE MANAGEMENT CLASSES

Visual Sensitivity Level

		High			Medium			Low
Special Areas		I	I	I	I	I	I	I
Scenery	A	II	II	II	II	II	II	II
	B	II	III	IV	III	IV	IV	IV
Class	C	III	IV	IV	IV	IV	IV	IV
		FG	BG	SS	FG	BG	SS	SS

Visual Prominence Zone 1/

1/ FG = Foreground-Middleground
BG = Background
SS = Seldom Seen

Note: Class I applies only to classified areas such as Wilderness, Primitive, Natural Areas, etc.

Source: BLM Manual 6300.

Appendix H

ARCHAEOLOGICAL SURVEY: METHODS AND RESULTS

In 1976, BLM initiated a program of archaeological survey in the Tuledad/Home Camp study area. The goals of the survey were multiple:

(1) Identify the nature and variety of archaeological sites present.

(2) Define sets of environmental parameters for the prediction of site densities through sampling.

(3) Characterize the co-osccurrence of site types in the chief physiographic units of the area.

(4) Assess the cultural resource impacts of potential spring and reservoir developments related to systematic grazing management.

To achieve the program goals, four separate survey efforts were mounted:

(1) A stratified, random sample of 2.75 percent of the grazing allotments was intensively surveyed. The sample was based on 1 square mile survey units; 29 such units were scrutinized in this effort (MAP 2-16).

Because habitat-type maps were not developed at the initiation of the study, the sample was stratified to give proportional testing of the co-occurrence of principal physiographic groups and vegetation communities. Three major physiographic categories (lowlands and basin floors, slopes and terraces, and rubble uplands) and four modern vegetation communities (greasewood-saltbrush, sage-grassland, sage-juniper, and mountain shrub) were plotted independently. Cross stratification yielded eight real discriminations for the area as a whole. (Because vegetation and physiography are not entirely independent variables, some of the 12 possible combinations do not occur. Greasewood-saltbrush/rubble uplands is one such.)

(2) To investigate the co-occurrence of sites along environmental gradients, five half-mile-wide transects were intensively surveyed, selected to cut across major physiographic features and biotic communities (MAP 2-16):

(a) A 6.5-mile transect across lower Tuledad Canyon, from the slopes of the Cottonwood Mountains to the first crest of the Coppersmith Hills.

(b) A 5.75-mile transect (with extended boundaries) along the rolling hills and stream-dissected slopes of the eastern flank of Duck Flat.

(c) An 8.5-mile transect from the Boulder Lake basin, across the intervening hills, to the southern extremity of Long Valley.

(d) A 7-mile transect (with extended boundaries) across the canyons and rubble uplands flanking Wall Canyon.

(e) A 12-mile transect crossing the lower Cottonwood Creek basin, from the mountains and canyons at the north to the sandy hills at the south.

(3) To give wider dispersal to the coverage of Duck Flat, an area long known to be rich in archaeological sites, 10 percent of the public lands in the largely homogeneous lowland area (2,172 acres) was intensively surveyed in a nonstratified random sample of quarter-section units (MAP 2-16). The survey was conducted under contract by the Archaeological Research Facility of the University of California, Berkeley (Busby and Wihr, 1976).

(4) In the course of project reconnaissance related to facilities proposed in support of the grazing system, 63 springs were surveyed in all environmental settings. In addition, 104 potential reservoir sites were surveyed. Approximately 1,200 acres received scrutiny in this effort (MAP 2-16).

TABLE H-1 summarizes the areas surveyed by the above strategies, as well as the coverage contributed by previous independent researchers.

The 389 sites recorded during the course of the 1976 survey sort into ten functional categories as discussed in Chapter 2 and enumerated in TABLE 2-39. A technical report on the survey results is being prepared for separate publication. In the interim, site reports will be filed with, and permanent site numbers obtained from, the Society for California Archaeology's Clearinghouse at Chico State University, Chico, California, and the Nevada Archaeological Survey, Northern Division, University of Nevada, Reno.

The average site density of the study area is calculated from the stratified sample to be 8.19 per square mile. Sample stratification, however, reveals that the density distribution is not uniform throughout the area. TABLE H-2 summarizes the observed site densities for the environmental strata on which the sample was based.

Three circumstances merit special notice, as they constitute variables for which the sample was not originally stratified:

TABLE H-1
TOTAL LANDS GIVEN INTENSIVE ARCHAEOLOGICAL SURVEY

Survey Source	Approximate Acreage	Percent of Study Area	Percent of Grazing Allotments	Percent of Public Lands
Independent Surveys				
McGonagle, 1972	4,960	.55	.73	.80
Fowler, 1976	520 1/	.06	.08	.08
BLM Surveys				
Stratified Sample	18,560	2.06	2.75	2.98
Transects	14,480	1.61	2.15	2.32
Duck Flat Sample	2,172	.24	.32	.35
Project Surveys	1,200	.13	.18	.19
Total of Combined Surveys	41,892	4.65	6.21	6.72

1/ The Fowler 1976 survey covered approximately 760 acres, 240 of which overlapped a BLM transect.

TABLE H-2
ARCHAEOLOGICAL SAMPLE RESULTS

Strata	No. of Sites Recorded	Density/mi.^{2}
Vegetation Communities		
Sage-Grassland	168	8.84
Sage-Juniper	29	4.83
Greasewood-Saltbrush	10	5.00
Mountain Shrub	9	4.50
Physiographic Groups		
Slopes-Terraces	126	9.69
Rubble Uplands	51	5.10
Basins	39	6.50
Cross Stratification		
Basin/Greasewood-Saltbrush	10	5.00
Basin/Sage-Grassland	29	7.25
Rubble/Sage-Grassland	36	6.00
Rubble/Sage-Juniper	13	4.33
Rubble/Mountain Shrub	2	2.00
Slope-Ter./Sage-Grassland	103	11.44
Slope-Ter./Mountain Shrub	7	7.00
Slope-Ter./Sage-Juniper	16	5.33

(1) The vast Duck Flat basin constitutes not only a zone of basin soils and sagebrush-grassland/greasewood-saltbrush vegetation, but was moreover the site, until recent years (when its principal water flow was impounded in Wall Canyon), of a playa lake and marsh system. Prehistorically, its resources were not unlike those still found in Surprise Valley. The former ecological regime accounts for the large number of villages and base camps focused on the old lake margin.

(2) A large region, comprising some 500 square miles, extending from the eastern flanks of Duck Flat to the eastern reaches of the Cottonwood drainage, is extraordinarily rich in obsidian. Within this area, 66 percent of the square-mile units sampled contain obsidian flows or large deposits of obsidian "float" or "bomb" nodules. These sources were in all cases exploited prehistorically for raw obsidian, but because the resource is extensive and exhibits few concentrations, quarry sites within the area bulk inordinately large. Clearly, there was little tendency to visit the same locale year after year. The largest obsidian source identified (a transect spanned its greatest dimension) covers nearly 3 square miles without discernable discontinuity of cultural materials. Several sites within this large region, furthermore, exhibit useable obsidian within their precincts, even though functionally they pertain to other site categories (such as base camps) as well. In these cases, lithic debitage (Glossary) is especially abundant, reflecting the ease with which the raw material could be acquired.

(3) The proximity to reliable sources of water clearly conditions the incidence of certain categories of sites. Major springs, particularly, are the locales of villages, upland base camps, and temporary camps. Because they occur in all biotic communities, in all soil groups, and in both lowland and upland settings, they introduce an environmental variable which crosscuts all others. The multiple survey strategies indicate that at least 75 percent of the major springs in Tuledad/Home Camp have occupation sites associated with them.

The categories of archaeological sites enumerated in Chapter 2 and TABLE 2-39 are not discrete entities, but rather are the physical traces of cultural systems composed of interrelated, interdependent activities. Particularly, subsistence pursuits and habitation have left detectable traces which reflect important geographic and seasonal stations in the system as it operated prehistorically. Thus the significance of an individual site, or a category of sites, can be assessed only with reference to the system of which it formed an integral part.

Such systems are notoriously difficult to reconstruct from surface indications, since in most cases it may not be possible to assign many sites to their appropriate position in a relative or absolute chronology; the effects of environmental change and cultural evolution will, therefore, remain obscure. A general model may be advanced, however, which relates the findings of the 1976 survey to some principal seasonal population movements identified in the historic period and inferred for several Great Basin prehistoric groups. The transect survey was particularly useful for establishing probable site linkages within limited ranges. The model, presented in FIGURE H-1, reflects a minimum set of possible seasonal movements in Tuledad/Home Camp. All phases of the Surprise Valley sequence are represented save O'Connell's latest (Bidwell) phase (identified by Desert Side-notched projectile points), which so far has been observed only sporadically. Milling stations, because they seldom exhibit chronologically diagnostic artifacts, are inferred for the whole sequence but they may, in fact, pertain only to a limited span. Further, the model reflects only what can be seen now on the ground; those activities (such as rabbit drives, plant gathering, burning of grassland, etc.) which have left no durable surface traces can only be inferred.

Appendix I

CALCULATION EXAMPLE, ANNUAL TOTAL HERBAGE AND LIVESTOCK FORAGE PRODUCTION AND LIVESTOCK FORAGE REQUIREMENTS

Habitat Type 4 (shadscale/Indian ricegrass) will be used as an example. For the purposes of these calculations, it is assumed there are 5,000 acres of Habitat Type 4. Habitat Type 4 has 37.7 percent climax composition (1976 Vegetation Studies). Habitat types with 26-50 percent climax vegetation are classed as "fair" condition (SCS Range Condition Guides). Climax composition potential was based on analysis of a relic site of this habitat type near Tuledad Canyon.

Based on clipping studies, the SCS calculated approximate annual herbage yields of 300 lbs/acre in favorable years and 150 lbs/acre in unfavorable years.

Annual Herbage Production Calculation

FAVORABLE YEARS

300 lbs/acre × 5,000 acres=1,500,000 lbs. of herbage

UNFAVORABLE YEARS

150 lbs/acre × 5,000 acres = 750,000 lbs. of herbage

Not all herbage is livestock forage. To determine livestock forage production, SCS initial rate guides are used.

A stocking rate is prescribed in acres per cow month based on forage production expected from a habitat in accordance with its range condition class. This stocking rate is then converted to pounds of forage production. Eight hundred pounds of forage is needed per cow month and, since stocking rate guides use the "take half-leave half" philosophy, 1,600 pounds of forage per cow month can be used for forage production calculations.

Predicted livestock forage production in future years is calculated in a similar manner. If the condition class of a habitat type changes, the SCS initial stocking rate guides would recommend a different stocking rate. The new stocking rate is then used to complete the calculations in the same manner as previously described.

Annual forage requirements by allotment for cattle, sheep and wild horses were calculated by multiplying the number of animals times the amount of air dry forage required to support one animal for one month times the number of months the animals are on the allotment.

Forage Requirements

1 cow per month—800 lbs of air dry forage.
1 horse per month—800 lbs of air dry forage.
5 sheep per month—800 lbs of air dry forage.

EXAMPLE: 200 cows × 800 lbs/month × 6 months = 960,000 lbs of forage required.

Forage Production Calculation

Acres/cow month for Habitat Type 4 in fair range condition class (the mean of this range is used):

Favorable Years—32-80 (56)
Less Favorable Years—80-160 (120)

Forage Calculation

FAVORABLE YEARS

5,000 acres ÷ 56 acres/cow month = 89.3 cow months

89.3 cow months × 1,600 lbs. forage/cow month = 142,880 lbs/forage

UNFAVORABLE YEARS

5,000 acres ÷ 120 acres/cow month = 41.7 cow months

41.7 cow months × 1,600 lbs forage/cow months = 71,440 lbs/forage.

Appendix J

VISUAL RESOURCE CONTRAST RATING

The following description and analysis is based on BLM Manual Chapter 6320.

The purpose of the Visual Resource Contrast Rating is to provide a method of assessing the potential visual impact of proposed management practices for BLM activities.

The objectives are to give BLM managers a measure by which they can determine if a proposed activity will meet the requirements of the visual resource management class for the area and an indication of which visual elements within a proposed management activity need to be modified in order to meet the visual resource management criteria.

The degree to which a management activity adversely impacts the visual quality of the landscape depends upon the amount of contrast that is created between the activity and the existing landscape character. This contrast can be measured by separating the landscape into its major features (land and water surface, vegetation and structures), and predicting the magnitude of change in contrast of each of the basic elements (form, line, color, and texture) for each of the features. Assessing the amount of contrast for a proposed activity gives a good indication of the severity of impact and serves as a guide in determining what is required to reduce the contrast to the point where it will meet the visual resource management class for the area.

For the degree of contrast for vegetation or landform modification, the existing vegetation is compared to the proposed modification of vegetation and the existing landform to the proposed modification of landform. For structures, the existing landscape (landform, vegetation, and structures) is compared to the proposed structure modification or addition on the landscape. If the activity does not meet the requirements for the VRM Class, rating scores are examined to attempt to reduce the impact more effectively. The project can be redesigned and run through the rating process again.

The visual contrast created by a management activity can be measured by determining the contrast caused by that activity in each of the basic elements.

The ease of detecting contrast in the basic elements varies on a scale from 4 (form) to 1 (texture). By assigning values that indicate degree of contrast, 3 for strong, 2 for moderate, and 1 for weak, a direct multiplier is set up for an indication of the strength of the contrast:

Elements		*Degree of Contrast*	
Form	4	Strong	3
Line	3	Moderate	2
Color	2	Weak	1
Texture	1	None	0

The contrast rating is applied in the planning stages to all proposed management activities that will disturb the soil, change or remove vegetation, or place a structure in the landscape. Application of the contrast rating system should be from the most critical viewpoint or points that are or will be commonly in use. When applying the rating system, the following factors determine how well the contrast is seen:

—Distance from which the project will be viewed.

—Angle of observation. The apparent size of a management activity is directly related to the angle between the viewers line-of-sight and the slope being viewed. As this angle nears 90°, the maximum area is viewable and becomes most critical.

—Length of time the project is in view. If the viewer has only a brief glimpse of the project, the contrast can almost be disregarded. If, however, the project is subject to view for a long period, as from an overlook, the opportunity to detect contrast becomes very critical.

—Relative size or scale of the project in relation to its surroundings.

—Season of the year and the effects of seasonal changes. The contrast rating should consider the heavy or most critical use season.

—Light and how it will effect the project being viewed.

—The effect time has on the healing process. Few projects can be expected to meet the visual class criteria immediately upon completion. With some long-term projects, it may be desirable to have both short-term and long-term objectives.

Contrast Rating Example

The contrast rating is applied to each of the types of features in the landscape separately. That is, a contrast rating is developed for the proposed change in land surface, vegetation, and structures. The ease of detection for each element is multiplied by the degree of contrast and the results are added for a total score. The total is not as important as the score for each individual feature but does give an indication of the overall magnitude of the impact.

The overall score (48) indicates a moderate impact. The vegetative contrast (27) is extreme, thus, the project would be very obvious. The most effective places to reduce contrast are in the form and line elements of vegetation, and the element of form in structures.

A total of 1-10 for each feature indicates the contrast can be seen, but does not attract attention; 11-20, attracts attention—the contrast begins to dominate the characteristic landscape; 21-30, a significant impact, should not be overlooked.

The following criteria are used to determine if the proposed activity will meet the visual resource management class (BLM Manual Chapter 6320):

VRM Class	*Standards*
Class II	The degree of contrast for any one element should not exceed 2 (moderate) and the total contrast rating for any feature may not exceed 10.
Class IV	The total contrast rating for any feature should not exceed 20.

Note: Classes I, III, and V are not applicable in the study area.

The contrast rating quickly points out the elements and features that will cause the greatest visual impact. This provides a guide to the most effective method of reducing the visual impact of a proposed activity or project. Those elements with the highest degree of contrast are the ones that should be examined to most effectively reduce the impact.

The following contrast ratings were made by the author; however, it should be noted that the rating procedure is highly subjective and conflicts must be viewed in that light.

In applying the visual contrast rating to the grazing system (both systematic and custodial), potential contrasts would be in the line, color and texture elements of vegetation features. The greatest contrast would possibly be in the line element presenting a conflict with Class II standards if the contrast were strong. There would not be a conflict with Class IV standards even if all potential contrasts were strong.

Areas excluded from grazing would have potential contrasts in the line, color and texture elements of vegetation features. The greatest contrast would possibly be in the line element presenting a conflict with Class II standards if the contrast were strong. There would not be a conflict with Class IV standards even if all potential contrasts were strong.

Fences would have potential contrasts in the line and color elements of land surface features, and in the form, line, color and texture elements of both vegetation and structures features. The greatest contrasts would possibly be in the form and line elements of vegetation features and in the form, line and color elements of structures features. If the contrast for any one element of vegetation or structures features is moderate, there would be a conflict with the standards for Class II lands. If the contrast in any one element of the vegetation or structures features is strong, there could be a conflict with standards for Class IV lands.

Cattleguards would have potential contrasts in the line and color elements of land surface features, and in the form, line, color and texture elements of both vegetation and structures features. The greatest contrasts would possibly be in the form and color elements of structures features. If either of these contrasts were strong, a conflict could exist with Class IV standards.

Spring developments would have potential contrasts in the line and color elements of land surface features, and in the form, line, color, and texture elements of vegetation features. The greatest contrasts would possibly be in the line and color elements of vegetation features. If either of these contrasts is moderate, there would be a conflict with standards for Class II lands; if either contrast is strong, there could be a conflict with standards for Class IV lands.

Reservoirs would have potential contrasts in the form, line, color and texture elements of both land surface and vegetation features. The greatest contrasts would possibly be in the form and color elements of land surface features and in the line and color elements of vegetation features. If any of these contrasts for land surface or vegetation features is moderate, there would be a conflict with Class II standards. If any of the contrasts for land surface or vegetation features is strong, there would be a conflict with Class IV standards.

Water troughs would have potential contrasts in the line and color elements of land surface features, in the form, color and texture elements of vegetation features and in the form, line, color and texture elements of structures features. The greatest contrasts would possibly be in the form and color elements of the structures features. If either of these contrasts were strong, there would be a conflict with Class II standards and there could be a conflict with Class IV standards.

Wells and windmills would have potential contrasts in the line and color elements of land surface features; in the form, color and texture elements of vegetation features; and in the form, line, color and texture elements of structures features. The greatest contrasts would possibly be in the form, line and color elements of structures features. If any of these contrasts were strong, there could be a conflict with Class IV standards.

Pipelines would have potential contrasts in the line and color elements of both land surface and vegetation features. The greatest contrasts would possibly be in the line elements of both features. Even if these contrasts were strong, the standards for Class IV lands would still be met.

Livestock trails would have potential contrasts in the line and color elements of land surface features, and in the form, line, color and texture elements of vegetation features. The greatest contrasts would possibly be in the form, line, color and texture elements of vegetation features. If one of these contrasts were strong, there could be a conflict with the standards for Class IV lands.

Reseedings would have potential contrasts in the line and color elements of land surface features, and in the form, line, color and texture elements of vegetation features. The greatest contrasts would possibly be in the line and color elements of vegetation features. If either of these contrasts were strong, there would be a conflict with Class IV standards.

Monitoring would have potential contrasts in the line, color and texture elements of vegetation features. The greatest contrast would possibly be in the line element, presenting a conflict with Class II standards if the contrast were strong. There would not be a conflict with Class IV standards even if all potential contrasts were strong.

EXAMPLE

	Element		Contrast	Score	Maximum Score Possible
Land Surface Features	Form - 4	X	None - 0	= 0	
	Line - 3	X	None - 0	= 0	
	Color - 2	X	Moderate - 2	= 4	
	Texture - 1	X	Moderate - 2	= 2	
			Subtotal	= 6	30
Vegetation Features	Form - 4	X	Strong - 3	= 12	
	Line - 3	X	Strong - 3	= 9	
	Color - 2	X	Moderate - 2	= 4	
	Texture - 1	X	Moderate - 2	= 2	
			Subtotal	= 27	30
Structures	Form - 4	X	Moderate - 2	= 8	
	Line - 3	X	Weak - 1	= 3	
	Color - 2	X	Weak - 1	= 2	
	Texture - 1	X	Moderate - 2	= 2	
			Subtotal	= 15	30
				48	90

Appendix K

METHODOLOGY TO DETERMINE UTILIZATION OF AVAILABLE FORAGE

This section sets forth the methodology used to determine the decreased utilization of available livestock forage by allotment as a result of unequal use of the A and B Treatment pastures due to specified seasons of use in the proposal.

The methodology is based on the following premises:

(1) The values determined for each allotment are estimates. Forage production may vary as much as 200-300 percent (Chapter 3, Vegetation).

(2) Use of pastures available for grazing (i.e., Treatments A and B) must be approximately equal in order to utilize all available forage. The actual carrying capacity of a particular first pasture may exceed one-half of the active allowable and therefore help to alleviate the effect of early grazing. The carrying capacity and the time spent in the first pasture are the limiting factors in this case.

(3) Since most habitat types within allotments are in fair condition and trends are generally static, it is felt that all allotments would support approximately the same amount of livestock use under systematic grazing management as they are currently supporting. This is assuming that all pastures have approximately equal carrying capacity. Use on allotments having pastures with unequal carrying capacity will be limited by the amount of use in the smallest pasture. This would be determined over time as systematic grazing management was implemented.

(4) All livestock are moved to the second pasture in order to calculate livestock use.

All Systematic grazing allotments were subjected to similar analysis to that shown in the following example. Results are found on TABLE 3-18 Livestock Grazing Section, Chapter 3.

Example of Methodology to Determine Forage Utilization

Duck Lake Allotment

Proposed Use

802 C   4½ month Season   04/01 to 08/15   3609 AUMs

Estimated carrying capacity of each pasture - 1805 AUMs

First Pasture

1805 ÷ 4 (04/01 - 07/31) = 451 head of cattle

451 C (04/01 - 07/31) = 1805 AUMs

Second Pasture

451 C   Seedripe (08/01 - 08/15) = 226 AUMs (leaves 1579 AUMs in second pasture.

TOTAL   2031 AUMs utilized.

2031 ÷ 3611 = 56 percent utilization of available livestock forage.

Possible Five-Month Season Which Would Utilize All Available Forage.

722 C   05/15 - 10/14 = 3284 AUMs

722   05/15 - 07/31 = 1805 AUMs use in the Treatment A Pasture

722   08/01 - 10/15 = 1805 AUMs use in the Treatment B Pasture

TOTAL   3610 AUMs utilized.

3610 ÷ 3611 = 100 percent utilization of available livestock forage.

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